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NORFOLK Bird & Mammal Report 1972

Published by The Norfolk Naturalists Trust
and The Norfolk & Norwich Naturalists Society

Vol. 23 Part 1

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Norfolk Bird Report - 1972

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Editorial Assistants: P. R. Banham and P. M. C. Stevens

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Norfolk Bird Report 1972

Editorial

Weather . . . Review of The Year . . . B.T.O. Common Birds Nest Census . . . Road Casualties . . . Unusual Nest Sites . . . Acknowledgements . . . Recording.

THE COUNCIL of the Norfolk Naturalists Trust, in co-operation with the Norfolk and Norwich Naturalists' Society, is pleased to present the annual report on the birds of Norfolk.

The weather: Main feature was the particularly cold and dull summer and early autumn. June, July, August and September all had below average temperatures; in fact June was even colder than in 1971 which was the coolest in Sprowston records.

Sunshine was much below normal during May, June, July and September. Autumn was also very dry with below average rainfall during August and September and particularly October which was the driest since 1925. December, even though it had only 17 days sunshine, was the sunniest for ten years.

Review of the Year: The 'top ten' breeding species in Norfolk in 1972 featured Bittern, Montagu's Harrier, Black-tailed Godwit, Ruff, Herring Gull (for the first time), 4,800 pairs of Sandwich terns, Golden Oriole, Bearded Tit, 3 pairs of Black Redstarts and Crossbill.

A succession of unusual migrants and vagrants provided exciting moments for the ever increasing numbers of observers. A highlight for many was the remarkable spring influx of 6 Little Egrets; more than one of these wanderers from South-east Europe made a prolonged stay. From the same region came a dozen Mediterranean Gulls.

East European autumn visitors included totals of 17 Red-breasted Flycatchers and 17 Barred Warblers. More surprising were 5 Greenish Warblers in only eight days. An unprecedented assembly of 110 Little Gulls was at sea off Holme in mid-October.

Among North European wildfowl were 51 Long-tailed Ducks off Hunstanton whilst for the first time on record a group of 10 wintered at Gorleston where just over 100 Velvet Scoters decorated the sea. Among other Scandinavian visitors were 80 Wrynecks, 220 Shorelarks and a Rustic Bunting (the second county record). Mealy Redpolls irrupted in considerable numbers.

From Asia beyond the Urals 4 Yellow-browed Warblers, a Pallas's Warbler and 8 Richard's Pipits rewarded careful searchers. The Pallas's was, in fact, the fourth occurrence at Holme.

Tundra travellers included 9 Arctic Redpolls and an autumn total of 133 Pomarine Skuas passing between Arctic Russia and the west coast of Africa.

Three North American birds provided red-letter days: Blue-winged Teal, White-rumped Sandpiper and Pectoral Sandpiper.

Globe spanners from the South Atlantic again provided entertainment for fortunate sea-watchers: Sooty Shearwaters from Tierra del Fuego and Great Shearwaters from Tristan da Cunha.

B.T.O. Common Bird Nest Census: Following drastic hedgerow removals, it was expected there would be a drastic reduction in the bird population on the Cranworth 246 acre farm plot. This failed to materialise, however; Wrens, in fact, reached an all time high.

The number of *pairs* was as follows: Mallard 5, Teal present, Kestrel present, Red-legged Partridge 13, Partridge 5, Pheasant 9, Moorhen 13, Lapwing 6, Snipe 1, Stock Dove 1, Turtle Dove 8, Cuckoo 3, Little Owl 1, Tawny Owl 1, Green Woodpecker present, Great Spotted Woodpecker 2, Skylark 26, Swallow 3, House Martin 2, Carrion Crow 2, Jackdaw 2, Great Tit 6, Blue Tit 15, Coal Tit 1, Marsh Tit 1, Willow Tit 1, Nuthatch 2, Long-tailed Tit 1, Tree Creeper 2, Wren 31, Mistle Thrush 3, Song Thrush 21, Blackbird 42, Robin 24, Sedge Warbler 2, Blackcap 4, Garden Warbler present, Whitethroat 2, Lesser Whitethroat 1, Willow Warbler 3, Chiff Chaff 2, Goldcrest 5, Spotted Flycatcher 2, Dunnock 36, Meadow Pipit present, Pied Wagtail 2, Starling 12, Greenfinch 6, Goldfinch 3, Linnet 5, Redpoll 3, Bullfinch 3, Chaffinch 31, Yellowhammer 25, Reed Bunting 3 and Tree Sparrow 21.

Road Casualties: Along a five-mile stretch of the A47 between Yarmouth and "Stracey Arms" totalled 94 birds as follows: 37 Black-headed Gulls, 7 Lapwing, 6 House Sparrows, 35 Moorhens, 5 Barn Owls, 2 Blackbirds and single Fieldfare and Mute Swan (RHH).

Unusual Nest Sites (1969–72): Pride of place must go to a tumbledown cottage and outbuildings on the edge of a Breckland wood which provided nesting sites in 1970 for 5 pairs of Blackbirds, 2 pairs of Robins, single pairs of Blue Tits and House Martin, 2 pairs of Swallows; in addition Jackdaws and Starlings had nests in the ruined chimneys and Great Tits utilised a broken water pipe. To complete this remarkable nesting list must be added Pied Wagtail, Spotted Flycatcher, Wren and Redstart.

Blue Tits reared young in a crack in the brickwork of Norwich Castle battlements. A tower crane framework at the U.E.A. residences site provided a nesting place for another pair of Blue Tits; when the crane moved back and forward along its track the parents continued feeding their young. Also enterprising was a pair of Blue Tits which raised young inside a steel side-support of a ten-ton tipping lorry in daily use at a Brooke quarry.

Wrens at Watlington nested in an old hurricane lamp in a barn. Gorleston Robins utilised the top of an up-turned broom for raising a family. Blackbirds nesting in a store building in the centre of Norwich built their nest over a fuse-box; another pair of city Blackbirds selected a chassis tool locker about to leave for Birmingham to have the tanker section fitted. Moorhens at Taverham (Deighton Hills) nested in a blackthorn plantation 1½ miles from the nearest water; the nest was built on the framework of an old Pigeon's nest.

Gorleston Swallows reared young in a nest constructed on top of a curtain pelmet. Despite noise, vibration and heat, Pied Wagtails reared young in a nest built on the engine of a Yaxham cement mixing machine in regular use.

Acknowledgements: Thanks are due to John Last for the cover drawing and to R. P. Bagnall-Oakeley and R. Harden for text illustrations; also to R. P. Bagnall-Oakeley, Dr. K. J. V. Carlson, H. A. Hems, E. E. Jackson, David and Katie Urry, Dr. R. Vaughan and W. J. Woolston for photographs; to Holme Bird Observatory/ N.O.A. for access to their records; to the Norfolk Naturalists Trust Wardens; to R. H. Harrison (Breydon); to the National Trust (Blakeney Point); to the Nature Conservancy (Scolt Head and Holkham); to J. Buxton (Horsey); to the Cambridge Bird Club (particularly G. M. S. Easy); to Gt. Yarmouth Naturalists Society; to Heacham and West Norfolk Nat. Hist. Society; to D. A. Dorling for compiling the annual record cards; to Mrs. M. Dorling, J. T. Fenton, Mrs. P. A. Rix, Mrs. S. F. Seago, C. & R. Seago for valuable assistance and to all other contributors.

Belated thanks are due to Dr. Carlson and to H. A. Hems for photographs of Sand Martins and Barn Owl appearing in the 1971 Report.

Recording: Records for the 1973 Report should be sent by the end of February to Michael J. Seago, 33 Acacia Road, Thorpe St. Andrew, Norwich, NOR 71T. Contributors are requested to submit notes in the order followed in B.T.O. Guide 13 (*A Species List of British & Irish Birds*). In order to minimise the work involved, records will not normally be acknowledged. The names of all contributors will be included in the Report.

Original articles are also welcomed. They should be submitted, type-written if possible, to the Editor, who reserves the right to revise such papers for publication in accordance with current editorial policy. Proofs of all contributions will be sent to authors before publication.

New members may be assured that their observations are appreciated and are recorded on an annual card index. However, as the normal pattern of events has been well established after a lengthy series of Reports, there is more opportunity for summary and not so much need to document less unusual occurrences. Observer's initials are normally reserved for the really unusual contributions.

Reserves

Barton Broad

Norfolk Naturalists Trust

Among Barton breeding birds were single pairs of Common Tern, Pochard, Tufted, Egyptian Goose and Kingfisher. 13 pairs of Herons had a successful nesting season in Heron Carr and several pairs of Great Crested Grebes reared young. Black Terns frequented the Broad for several weeks in early summer. Also of interest were 2 Goosanders in January, 2 Marsh Harriers February 7th/8th, 2 booming Bitterns, Common Scoter September 3rd and Grey Phalarope on November 18th.

Blakeney Point

The National Trust

A breeding attempt by Sandwich Terns was unsuccessful due to bad weather and high tides. Common Terns, however, had a good season. A pair of Herring Gulls reared 3 young – the first occasion this species has nested in Norfolk. A summary of nests appears below:

Mallard	4	Herring Gull	1
Shelduck	30	Common Gull	1
Red-legged Partridge	5	Common Tern	1,700–1,900
Oystercatcher	120–130	Arctic Tern	2
Ringed Plover	180	Little Tern	200–220
Redshank	23	Blackbird	1

Breydon Water

Local Nature Reserve

A further decline in the numbers of geese wintering in the area was noted 75 White-fronted Geese on 30th **January** and 6 Pink-footed Geese on 29th being peak figures. A single Brent Goose stayed several weeks in company with Shelduck. Wildfowl counts included 700 Shelduck, 2,000 Wigeon, 140 Pintail, 176 Teal, 46 Goldeneye, 3 Scaup and 4 Tufted. Regular wintering herds of Mute Swans are in decline, but 142 were present 13th February; 46 Bewick's Swans appeared 30th January.

Other January visitors included Merlin, Peregrine and Hen Harrier with up to 16 Short-eared Owls on Halvergate Level. Highlights were Shorelark, Slavonian Grebe and at least 3 Glaucous Gulls on the south wall refuse tip.

February saw an estimated 1,000 Redshank with 125 Cormorants on 13th. Wildfowl included 66 Bewick's Swans, 1,500 Wigeon, 70 Pintail, 33 Pochard and single Red-breasted Merganser and Goosander. Surprises were 3 Shorelarks on 3rd and drake Red-crested Pochard on 5th. Among waders were 250 Golden Plover and 800 Knot. Over 80 Twites were on the saltings, up to 80 Snow Buntings and 5 Lapland Buntings were recorded. Hooded Crows peaked at 11 when 1,500 Great Black-backed Gulls were using the refuse tip. A Buzzard was new on 29th.

March opened with single Water Pipits on 1st and 8th; 2 more passed through on 31st, one being in breeding plumage, A Spotted Crake stayed a week from 3rd. Bewick's Swans were much in evidence: the largest herd was 92 on 5th; several

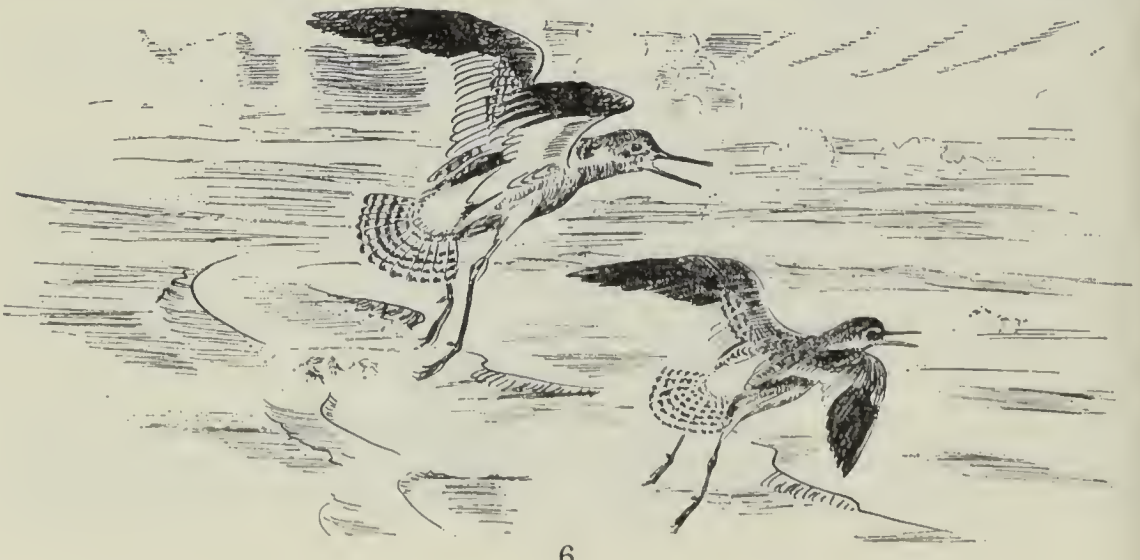
herds passed east and out to sea. Other wildfowl included 850 Wigeon, 163 Pintail, 46 Goldeneye and 53 Teal. An early Avocet appeared on 19th followed by 8 on 25th when a Garganey was new with 2 more next day. 118 Cormorants were still present, Hooded Crows increased to 18 and Twites numbered 26. Black-tailed Godwits in ones and twos appeared from 16th when up to 4 Jack Snipe remained. Other migrants included Wheatears from 22nd and Black Redstarts on 24th.

The following wildfowl remained in **April**: 42 Pintail, 3 Gadwall, 3 Red-breasted Mergansers and single Scaup. Whimbrel arrived on 3rd, single Avocets on 18th and 29th, 3 or 4 Spotted Redshanks and 781 Redshanks on 17th, also Curlew-Sandpiper on 30th. An obvious escape was a Chilean Flamingo on 30th and doubtless the same bird returned several times during the summer until mid-August. Black Redstarts were singing at the Yarmouth end of the estuary for several weeks. Twites remained until 13th, Snow Bunting until 11th and 11 Hooded Crows until 26th. The last day of the month provided 16 species of waders including Ruff, Common Sandpiper and Little Ringed Plover.

As expected **May** was exciting and 22 species of waders appeared, among them Avocet on 6th, Little Ringed Plover on 7th and Curlew-Sandpiper on 14th. Bar-tailed Godwits peaked at 45 on 7th with 4 Black-tails on 12th. Several Spotted Redshanks put in an appearance, but no Greenshank. Other waders of note included 23 Turnstones on 8th, 29 Grey Plovers on 19th and 102 Knot on 17th. Surprises were Spoonbill on 2nd, Hobby on 29th and up to 3 Red-breasted Mergansers between 7th and 10th. The month's highlight was a Little Egret on 4th which stayed four days on the adjacent marshland. 3 Wigeon were present on 19th, a drake Garganey remained all month and up to 14 Great Crested Grebes were resident. 5 Black Terns passed east on 12th with another on 19th.

June was relatively quiet apart from Spoonbill on 6th and 17th; 1–2 Avocets between 5th and 30th and Black Tern on 27th. Among wildfowl were single drake Wigeon and Garganey and 487 Shelduck in a single group on 26th when the first Whimbrel had returned. A Greenshank had arrived two days earlier.

Among breeding birds were reduced numbers of Redshank and Lapwing apparently due to activity and disturbance caused by reclamation work on parts of the adjoining marshland. Mallard had a good season and 2 pairs of Gadwall and 3 of Shoveler nested. The first brood of Shelduck appeared 6th June, but they had a poor season. Oystercatchers increased to 9 breeding pairs (including four on the north wall marshes and one on the refuse tip). Short-eared Owls bred at Wickhampton and possibly at Berney Arms; Kestrels nested as usual in derelict



marsh drainage mills. A pair of Barn Owls bred. Other nesting birds included 10 pairs of Little Grebes and for the first time a pair of Corn Buntings.

July was also quiet although one or two Spoonbills stayed two weeks from the 13th. Their visits were restricted to early morning and evening. The majority of the Shelduck departed on 15th leaving 50 juveniles and a few guardian adults. Waders included 19 Whimbrel on 21st and Curlew-Sandpiper on 22nd with up to 5 Greenshank. Little Terns began assembling at the eastern end of the estuary and 70 (including 36 birds of the year) were present on 26th. Common Terns peaked at 131 and Sandwich Terns at 21.

August saw the reappearance of 2 Spoonbills from 4th to 13th. 2 Avocets were new from 5th staying a week, and a party of 7 dropped in on 30th. A Wood Sandpiper arrived on 9th and there were 2 on 16th. Curlew began building up: 103 were present on 29th when 39 Whimbrel were on show. Wader counts included 59 Oystercatchers, 23 Bar-tailed Godwits, 10 Black-tailed Godwits, 11 Curlew-Sandpipers, 3 Spotted Redshanks, 11 Greenshanks, 16 Common Sandpipers and 1–2 Little Stints. Amongst wildfowl were 9 Wigeon and an early Pintail on 3rd. A dozen Great Crested Grebes were present including two juveniles. Also interesting were Short-eared Owl on 8th and 26th, Marsh Harrier on 16th and Kittiwake on 20th.

September highlights were Spotted Crake on 11th and Hoopoe on 12th. Also notable: Fulmar on 24th, several Black Terns on 8th/9th and Grey Wagtail on 21st. Bar-tailed Godwits peaked at 81 on 24th and up to 7 Black-tails passed through. Other waders were 17 Turnstones on 9th, up to 13 Curlew-Sandpipers and 3 Little Stints. The first Rock Pipit returned on 11th with Lapland Bunting on 19th. Cormorants peaked at 22 and an early Hen Harrier passed through on 10th.

October brought the first Jack Snipe on 2nd with Twite on 4th and Snow Bunting next day. Notable were Little Gull on 11th and 70 Grey Plover in a single group on 3rd. 65 Bar-tailed Godwits remained on 11th and a Spotted Redshank until 23rd. 9 Bearded Tits were in a dykeside on 7th and 1,036 Knots were counted on 19th. A late Curlew-Sandpiper was on the muds on 17th when 6 Scaup arrived.

November wildfowl counts included 635 Wigeon, 48 Pintail, 3 Goldeneye and 44 Scaup. 48 White-fronted Geese passed through on 6th and the first 3 Bewick's Swans appeared on 12th. The adjacent marshes at this time held over 35 Short-eared Owls mainly in the vicinity of Halvergate Fleet. Kestrels were much in evidence at Halvergate, 16 being in the air at the same time. Among waders were 6 Bar-tailed Godwits on 30th with 5 Black-tails on 19th and over 3,000 Dunlin and 600 Knot. 11 Lapland Buntings were recorded on 9th and Twites peaked at 45 on 19th.

December surprises were few, but a Dipper on the 10th was very notable. It was on a pier of Yarmouth Haven Bridge when first seen later flying up the main Breydon channel. It was considered to be either the British or Central European form showing a rufous belly. The only White-fronted Geese present were 29 on 31st. Bewick's Swans peaked at 23 and 2 Whooper Swans passed through on 24th. The same day produced an exceptional total of 116 Short-eared Owls on Breydon marshes; at one time no less than 80 were in the air together. A week later the same area produced 90 owls. Among wildfowl were 56 Scaup, 154 Pintail and 900 Wigeon. Also of interest was a Water Pipit on 9th and 13th, Stonechat on several dates and 17 Lapland Buntings on 24th. Waders were scarce, but 158 Curlew were present on 31st.

Cley Marsh

Norfolk Naturalists Trust

After an absence as a breeder for many years a pair of Pochard nested on the Marsh. Other nesting birds included Bearded Tits and a pair of Bitterns. Black-tailed Godwits returned March 10th, but there was no breeding success.

The Migration section of this Report contains details of the many migrants passing through Cley. Among 1972 highlights were Little Egrets, White Stork, Gull-billed Tern, Aquatic Warbler and Red Kite.

East Wretham Heath

Norfolk Naturalists Trust

The water levels at both Lang Mere and Ring Mere fell dramatically in the autumn; as a result fewer wildfowl put in an appearance. Noteworthy visitors included Goosander at Ring Mere and Black-necked Grebe at Lang Mere February 20th, up to 3 Bewick's Swans from November 19th and up to 40 Gadwall December 3rd and single Scaup.

Among nesting birds were Long-eared Owl (4 young reared), 2 pairs of Tufted Duck, Redstart, Nightingale (4 singing males) and Nightjar. A pair of Great Crested Grebes was unsuccessful. Crossbills were a regular feature. Up to 10 Hawfinches were resident in hornbeams until April 9th and from October 22nd. Passage migrants included Rough-legged Buzzard March 26th, Little Ringed Plover (April 3rd), Ruff (September 5th), Spotted Redshank (August 27th), Greenshank (August 13th and 29th), Whimbrel (May 7th), Green Sandpiper (September 24th), Black Tern 3 (May 8th) and Montagu's Harrier (July 10th).

Hardley Flood and Chedgrave Common

Norfolk Naturalists Trust

Among the year's highlights were Blue-winged Teal in early spring and again in November and Ferruginous Duck at the end of December. Breeding birds included 4 pairs of Common Terns and 3 pairs of Great Crested Grebes, together with Mallard, Teal, Gadwall and Shoveler; 2 Pochard's nests were found. 35 pairs of Shelduck summered and several broods of young assembled on The Flood. Bitterns and up to 25 Bearded Tits were recorded from time to time. Other notable visitors included Great Grey Shrike in January, Red-throated Diver in February/March, 5 Bewick's Swans, Pintail, Garganey from April 2nd, 4 Black Terns and 2 Wood Sandpipers in May, Spoonbill June 2nd, 2 Avocets on 11th and also Sparrowhawk, 11 Cormorants and a late Chiffchaff December 5th.

Hickling Broad

Norfolk Naturalists Trust

Marsh Harriers in ones and twos were frequent visitors throughout the year, but despite aerial display high over Swimcoots there was no nesting attempt. Winter visitors in the opening months included Hen Harriers, the usual species of wildfowl, together with Whooper and Bewick's Swans.

Ruffs returned February 28th, followed by Black-tailed Godwits March 16th and Garganey on 23rd. The first Spotted Redshank for the year was noted on April 9th, with Grey Plover May 9th and Whimbrel on 16th. Among other May visitors were Black Tern on 1st, Spoonbill on 19th and Red-backed Shrike on 28th. June was also interesting when Rush Hills attracted 3 Avocets on 12th and 5 Spoonbills on 28th.

Four booming Bitterns were recorded (at Swimcoots, Holkham Pit, Whiteslea and Rush Hills). Bearded Tits nested successfully with concentrations between Whiteslea and Deary's Flood; Swimcoots, Heigham Sounds and Rush Hills; and Bygrave Marsh. Among breeding wildfowl were Tufted and Pochard, 2 pairs each of Garganey and Shelduck and 6 pairs of Gadwall. Three pairs each of Pintail and Wigeon remained until late in the breeding season. 28 pairs of Herons nested (21 in Sounds Wood, 3 in Waggonhill Wood and 4 in McHardy's Wood), 3 pairs of Common Terns (on Rush Hills), 2 pairs of Kestrels (in Stubb's Mill and in a straw stack), one pair of Long-eared Owls (in Waggonhill Wood), 3 pairs of Barn Owls (2 of the nests were located: in the Whiteslea Lodge owl box and in a hollow tree), 2 pairs of Ringed Plovers and 3 pairs of Kingfishers. Two pairs of Little Terns summered.

Autumn waders began returning from the last week in July and by mid-October 22 species had been identified including Red-necked Phalarope August 24th. A Ring Ouzel passed through October 19th when a wintering Stonechat returned followed by Hen Harrier in November and Jack Snipe in December.

Holme Nature Reserve

Norfolk Naturalists Trust

Among breeding birds on the wader pools were 2 pairs of Ringed Plovers and a pair of Oystercatchers. A pair of Avocets stayed four days early in June. Six families of Shelduck appeared on Broadwater, but following high winds only one family survived. Short-eared Owls nested in the area.

Migratory records are fully recorded elsewhere in this Report.

Horsey Mere

John Buxton

Bitterns began booming late in February and within a month 5 were in evidence including one in a new area recently flooded. Bearded Tits were often following the reed-cutters in winter; one party was joined by a cock Stonechat. Between 25 and 30 pairs of Bearded stayed to breed. Hen Harriers – up to 4 together – were a regular feature in the autumn and winter. One evening in late March a group of 6 harriers (2 male Hen, 2 female Hen and 2 female Marsh) were observed flying slowly in each other's company before roosting in the reedbeds. Two female Marsh Harriers lingered all summer and a male put in an appearance in mid-May.

Breeding birds included 2 pairs of Oystercatchers, 50 pairs of Black-headed Gulls and single pairs of Pochard and Tufted; 2 pairs of Great Crested Grebes bred on the Mere. Nearer the sea family parties of Stonechats and Red-backed Shrikes were observed.

Martham Broad

Norfolk Naturalists Trust

Seven species of ducks wintered including a raft of over 100 Tufted and Pochard. A Bittern's nest was recorded in the adjacent Starch Grass. Marsh and Hen Harriers, Kingfishers and Water-Rails appeared from time to time. Bearded Tits nested successfully and family parties of up to 10 young were on show during the early autumn. A Spoonbill was an interesting mid-summer visitor July 25th. The alders edging part of the Broad attracted wandering parties of Redpolls, Siskins and Long-tailed Tits.

Ranworth Broad

Norfolk Naturalists Trust

Peak numbers of wildfowl assembled at Ranworth during January; on 21st a count totalled 500 Wigeon, 23 Tufted, 10 Pochard, 50 Teal and 250 Mallard. The first 2 Great Crested Grebes returned the same day. The Wigeon flock remained until the end of February.

A total of 43 pairs of Common Terns nested on the rafts; 53 young fledged. 10 pairs of Herons nested in the usual two colonies.

Roydon Common

Norfolk Naturalists Trust

Hen Harriers were again a winter feature and up to 3 (including a male) remained until March 17th; the first ring-tail returned November 20th and was later joined by a male. Carrion Crows – which frequently mobbed the harriers – were a feature and 70 roosted on the Reserve until mid-February, numbers declined to 30 by April 12th. The roost was re-occupied by 40 birds from mid-September with a peak of 100 December 10th.

Among breeding birds were 2–3 pairs of Curlews, Shelduck and Nightjar; Yellow Wagtails failed to return. Also of interest was a Stonechat for seven weeks from October 21st. A total of 82 species has been recorded at this Common in three years.

Scolt Head Island

The Nature Conservancy

A record total of 4,800 pairs of Sandwich Terns summered (compared with 4,400 pairs the previous year). The first 200 arrived April 3rd, increasing to 1,000 by 21st and to 4,000 by May 1st. First eggs were laid April 28th and by June 1st there were 4,800 pairs and 3,500 nests (latter figure exludes 500 pairs whose nests failed due to predation and other causes). Final total was 4,200 successful nesting pairs. The proportion of two-egg clutches was 10% and the proportion of addled eggs between 8% and 10%. Some 200 dead chicks were found. An estimated minimum of 3,300 chicks fledged.

600 pairs of Common Terns began nesting from May 18th. Despite a high hatching success only 50 chicks reached the flying stage due largely to predation by Short-eared Owls and a Kestrel. Seventy pairs of Little Terns nested resulting in over 100 chicks fledging; a most successful year. Two pairs of Arctic Terns nested, but no young were reared; a male Kestrel took 2 chicks. 300 pairs of Black-headed Gulls nested in the ternery and 200 chicks fledged. A pair of Common Gulls laid 2 eggs which failed to hatch; 3 other pairs displayed in June.

Other breeders included 150–155 pairs of Oystercatchers, 155–160 pairs of Ringed Plovers, 30 pairs of Redshank, 2 pairs of Blackbirds and a pair of Swallows.

Stiffkey Binks

Holkham National Nature Reserve

350 pairs of Sandwich, 135 pairs of Common and 12 pairs of Little Terns, 10 pairs of Oystercatchers, 12 pairs of Ringed Plovers and 20 pairs of Black-headed Gulls all nested.

Titchwell Marsh

Norfolk Ornithologists Association

Spring passage continued until late May where there was a large passage of Turtle Doves with up to 1,000 in one day. Earlier in the month 40 Turnstones, 20 Grey Plovers and 200 Sanderling were roosting on the beach at high water. Among breeding birds were several pairs of Bearded Tits, 20 pairs of Little Terns and 5 pairs of Common Terns.

June surprises were Osprey on 3rd, Marsh Harrier on 4th and female Golden Oriole on 5th. Autumn wader passage commenced in the second week of July when the variety included Grey Plover, Whimbrel, Common and Green Sandpipers, Greenshank and Curlew-Sandpipers. Among August visitors were Corncrake on 25th and Purple Sandpiper on 28th.

Weeting Heath

Norfolk Naturalists Trust

At least 4 pairs of Stone-Curlews nested in the enclosure, in company with the usual numbers of Wheatears and Lapwing. Kestrels bred in an old Scots pine.

Welney Wildfowl Refuge

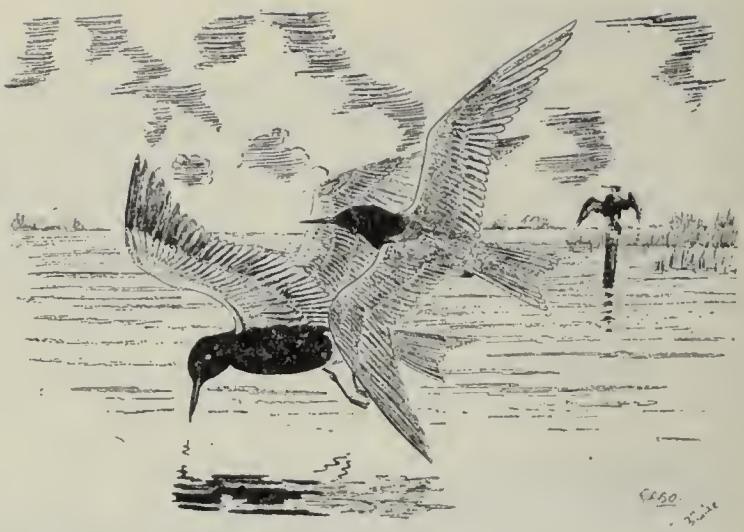
Wildfowl Trust

Despite a relatively mild winter numbers of duck during January were consistently high: a count on 15th produced 22,000 Wigeon, 2,300 Mallard, 2,000 Teal, 450 Pintail and 200 Shoveler. High water levels at this time drove the Wigeon to feed on the grass of the new screen banks, often within feet of the observation hides. The lagoon in front of the Observatory was the home of a great flock of Bewick's Swans, totalling 400 through January rising to a peak of 550 in late February and keeping at this level for a fortnight. With them were up to 31 Whooper Swans and 100 Mutes. All these swans were fed daily by the warden and became completely accustomed to his appearances with barrows of wheat. The majority of the Bewick's left rather suddenly in mid-March, but 2 stayed until mid-April.

Although Wigeon numbers dropped right away to 14,000 in February and to 9,000 in March there was a brief influx of Pintail in the latter month with 600 on the 11th, when there were also 500 Shoveler. Up to a dozen White-fronted Geese and 2 Bean Geese were identified.

The breeding season had begun well before the last 2 Bewick's departed though early broods of Mallard suffered heavy losses in the wet cold weather at the end of April. Four pairs of Black-tailed Godwits nested (2 pairs were successful rearing 3 and 2 young), as did 2 pairs of Ruffs and they and the later ducks reared their young. Among the latter were more Mallard, together with Teal, Garganey, Shoveler, Tufted and Shelduck.

The autumn build-up of ducks was fairly slow with only 2,000 Wigeon present in mid-October, with 1,600 Mallard and 400 Teal. The first Bewick's Swans arrived in early October, but increased steadily so that by mid-November there were 350. At this time too the duck numbers started to increase with 12,500 Wigeon on November 23rd. However, this figure was dwarfed at the end of the year when it was estimated that there were no less than 30,000 Wigeon on the Refuge. Other wildfowl numbers remained low with no more than 2,000 Mallard and 1,300 Teal. Pintail and Shoveler both reached 500. Bewick's Swans increased to 540 by the year end when there were also 21 Whooper Swans and up to 23 White-fronted Geese.



Migration

Cley and Salthouse

During the first few weeks of the year several thousand Wigeon frequented the Reserve; on the 2nd a Hen Harrier appeared. 15 White-fronted Geese together with 150 Golden Plovers arrived **January** 12th. 9 Shorelarks were noted on 16th and a small herd of Bewick's Swans headed west on 17th.

Up to 13 Ruffs remained in the area from the beginning of the year until the end of **February.** A small movement was noted on 29th when 8 White-fronted Geese and a single Bean Goose appeared.

In early **March** winter visitors began departing for breeding grounds and 9 Whooper Swans headed east on 6th; the 8th brought the first spring visitor: a drake Garganey. 2 White-fronted Geese and a Bean Goose on 12th were followed by the first Black-tailed Godwit on 10th with 3 more on 21st. Display began in the next few days, but there was no breeding success. The first of the passerines – a Chiffchaff, was recorded on 22nd. Wheatears arrived next day. By the month end the Ruff total was 22 and the first Sandwich Tern flew in on 31st with single Sand Martin next day.

A movement of Swallows, Yellow Wagtails and White Wagtails on **April** 3rd heralded a real start to the spring movement. More Yellow Wagtails and 18 Sandwich Terns came on 5th, Common Tern on 6th and Avocet on 7th. A Spotted Redshank was present on 9th and a Ring Ouzel next day. A late Hen Harrier was spotted on 12th, Sparrowhawk on 17th and Hoopoe over the East Bank on 20th, followed on 21st by Little Tern and Sedge Warbler and Reed Warbler on 24th. Thirty Bar-tailed Godwits and 3 Red-breasted Mergansers were present on 27th, 4 Bramblings and Marsh Harrier on 28th and Montagu's Harrier and Little Egret on 30th, the latter gracing the Reserve until 7th May.

May 1st saw the arrival of many migrants including Black Tern, Blue-headed Wagtail, Turtle Dove, a late Glaucous Gull and many Swifts. A Great Grey Shrike was late on 2nd whilst the 5th saw the return of the first Red-backed Shrike to Salthouse Heath. A few Black Terns, an Avocet and a small movement

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Added to the county list as recently as 1952, the Little Egret has become a spring vagrant from Southern Europe. In 1972 at least six visited Norfolk between April 30th and July 12th.

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Water-Rails are very secretive in the breeding season, except for peculiar grunting and squealing noises made in the reed-swamps. These normally shy birds often become casualties when migrating at night: electric cables, telephone wires and light-vessel lanterns all claiming victims.

of Redstarts were all recorded on 6th followed by Bluethroat, Tawny Pipit, Wryneck, Hobby, Temminck's and Little Stints, Wood Sandpiper, Little Gull and White Stork all on 7th. Ring Ouzel, Kentish Plover and Marsh Harrier were noted on 8th, the latter staying until 11th. A Kentish Plover and 2 Temminck's Stints were again noted on 13th/14th. A spotted Redshank was new on 18th, also Spoonbill (joined by a second bird on 20th – one staying until the 23rd). 3 Temminck's Stints and Short-eared Owl with another Avocet followed between 19th and 24th. Bitterns began feeding their young at this time. A Little Gull and another Black Tern were noted on 21st, Little Ringed Plover on 22nd with Montagu's Harrier on 26th. Highlight of the 28th was another Kentish Plover which stayed five days. 2 Little Egrets arrived next day and one remained to be joined by a Spoonbill.

As spring migration abated **June** produced an Osprey on 1st. The 3rd brought another Little Egret which unlike the two mentioned earlier did not show any head plumes and was presumably an immature. It remained until 12th July. Two Curlew-Sandpipers were new on 3rd, 7 Avocets on 7th were followed by 4 more on 11th; a cock Montagu's Harrier stayed between 9th and 14th. A spotted Redshank in winter plumage on 17th was followed by a magnificent black individual on 18th. A Greenshank appeared on 25th with 2 more Spotted Redshanks and a Hobby next day.

A Wood Sandpiper **July** 6th was the first of the waders to return and by the 9th Ruff, Greenshank and Whimbrel had all arrived. Wood, Green and Common Sandpipers were noted in ones and twos from 14th onwards. The first Arctic Skuas moved along the coast on 16th with 3 red Curlew-Sandpipers next day. Seven more Curlew-Sandpipers were noted on 20th and a party of 90 Shelduck headed west on 23rd. By the month end 4 Little Ringed Plovers, Little Stint and numerous Ruffs were present. A late Pochard's nest was found July 27th.

Two juvenile Montagu's Harriers passed through **August** 9th and highlights of the next day were Kentish Plover, Temminck's Stint and Little Gull. The 14th produced a good wader selection including Black-tailed Godwit, Little Ringed Plover, 2 Temminck's Stints and Spotted Redshank. A Peregrine passed through on 19th; also Purple Sandpiper. Another Temminck's Stint was found on 21st, Glaucous Gull on 24th and Purple Sandpiper next day. Towards the end of the month, Arctic, Great and Pomarine Skuas were all appearing regularly; 20 Curlew-Sandpipers were feeding in front of the main hide. Blakeney Point produced both Greenish and Barred Warblers on 27th whilst a Gull-billed Tern ranged off-shore for seven days until September 3rd. An Aquatic Warbler was found at the Coastguard lookout on 29th. The 30th brought a flurry of waders (3 Little Stints, 6 Spotted Redshanks, 2 Little Ringed Plovers and a few Curlew-Sandpipers), together with Bluethroat and Long-tailed Skua. Next day the first substantial fall of small migrants included 3 Wrynecks, Firecrests, Red-breasted Flycatcher and Bluethroat, together with 2 Icterine Warblers at the Point.

September began with Black Redstart on the Point and an Aquatic Warbler on 1st (followed by another Aquatic on 15th) and 2 Icterine Warblers on 2nd skulking in Walsey Hills when another Greenish Warbler in the Plantation at the Point. Next day a Long-tailed Skua passed close to the beach with another on 26th. Also on 3rd were 20 Little Stints, 25 to 30 Ruffs, Spotted Redshank, Green and Wood Sandpipers and over 40 Curlew-Sandpipers. A solitary Snow Bunting arrived on 6th and 14 Little Stints remained on 11th. Redwing and Fieldfares reached the Point on 13th. A Grey Pharlarope stayed overnight on 12th/13th (others came on September 29th, October 21st and November 29th),

while a Pectoral Sandpiper was discovered on Carter's Pool on 14th where it remained until 20th. Red-necked Grebe was new also 20 Spotted Redshank. A Manx Shearwater on 16th was followed by another next day when a Sooty Shearwater was spotted. Lapland Buntings and 20 Snow Buntings came in on 18th with Richard's Pipit on 19th. Black Terns were present in twos and threes between 20th and 22nd and a Water Pipit was found on 23rd. The first Shorelark arrived on 28th (with 9 on October 13th), when Ring Ouzel and 2 Velvet Scoters were recorded with Jack Snipe next day.

October 2nd brought another Richard's Pipit and 5 Little Gulls; next day a Firecrest was noted and a Red-breasted Flycatcher was in the Warden's garden. An Icterine Warbler was recorded on 4th, followed by Great Grey Shrike on 6th, Black Redstart on 11th, 12 Ring Ouzels and Firecrest on 14th; also 15 Jack Snipe. A Spotted Crake, usually a most difficult bird to observe, remained on view by the Glaven Sluice for several days on 18th. A Grey Phalarope was on the sea on 22nd, Rough-legged Buzzard put in occasional appearances from 23rd, Long-tailed Duck was new on 25th, 2 Velvet Scoters on 26th, Great Shearwater on 27th and Hen Harrier from 28th. Lapland Buntings were present at this time.

As winter approached, 32 Bewick's Swans headed west on **November** 1st. Shorelarks reached a peak of 100 by the 6th and this high total remained until Christmas. 5 Waxwings were found on 20th.

December produced a wealth of wildfowl including 2,000 Wigeon. A Hen Harrier was recorded on 16th, a small party of Bewick's Swans moved west on 24th and Great Grey Shrike was found on 29th. A Bean Goose and 2 White-fronts joined the resident Canadas on 30th and the year ended with Black-throated Diver and Red Kite on 31st.

Holme

The new year began with 2 Avocets on the 1st, the first mid-winter record for this area; a Sparrowhawk also appeared. 4 Bewick Swans passed through on the 8th **January** with a further 28 flying west on the 19th. A number of interesting wintering species were recorded during the month including 19 Goldeneye, Slavonian Grebe, 2 Long-tailed Ducks, 30 Snow Buntings, Red-breasted Merganser and 20 Shore larks. Also a Green Sandpiper, another new winter record.

February produced 3 Purple Sandpipers on the 10th with Siskin present through most of the month. A Peregrine and 2 Woodcock appeared on the 27th.

March apart from the dispersal of some winter visitors, produced little in the way of new arrivals. Song Thrushes, Blackbirds, Redwings and Goldcrests continued to drift through. Notable spring arrivals included a pair of Garganey and a Wheatear on the 20th; the first Chiffchaff arrived on the 23rd when a very early Ring Ouzel was seen. The month ended with 3 more Wheatears and a Chiffchaff. 150 Golden Plover, 3 Short-eared Owls, a number of Hooded Crows and some Bearded Tits were also noted.

April as last year, was cold, wet and blustery with the result that spring migrants were scarce. 3 Velvet Scoters and a Great Grey Shrike were still present on the 1st and 12 Eiders on 3rd when the first 3 Sandwich Terns arrived. The following day 3 Ring Ouzels, 2 Chiffchaffs and a Blackcap were noted. A Black Redstart appeared on the 5th with another on the 10th. 7 Shorelarks remained from the 6th until the 12th. By the 8th the first Willow Warbler arrived, 6 Brent Geese were still present. The 9th heralded the arrival of the first Swallow, a Black-tailed Godwit and 3 Long-tailed Ducks were at sea. A Great Grey Shrike, Red-throated Diver and a Red-breasted Merganser arrived on the 10th with Firecrest,

some Tree Pipits, 20 Sandwich Terns, Grey Wagtail and Ring Ouzel. The 12th saw 4 Gannets over the sea, Yellow Wagtail and Chiffchaff. Sand-Martins appeared on the 13th when 2 Velvet Scoters were seen. A Siskin was present next day and up to 5 Swallows were noted. A Redstart was discovered on the 15th and Grasshopper Warbler on the 17th. From then on until the end of the month cold north winds held up further movements, apart from a Sparrowhawk ringed on the 21st. Greenshank arrived on the 26th, and Whimbrel on 28th as the weather began to improve, followed by the first Little and Common Terns and Sedge Warbler the next day. On the 30th the first Cuckoo was heard, Swallows passed through all day in small numbers together with the first Swifts; 3 Common Sandpipers, a few Whimbrel, 3 Goosanders and 2 female Montagu's Harriers also appeared.

The weather continued poor in **May** with strong winds between north and south-west and heavy storms; however, the 1st did produce 2 Lesser Whitethroats, 4 Tree Pipits, 2 Blackcaps and 6 Yellow Wagtails, together with a few House Martins and Sand Martins. Turtle Dove and Whinchat made an appearance on 2nd with an influx of 30 Willow Warblers, Redstart and Blackcap. Pied and Spotted Flycatcher and Whitethroat turned up on 6th when a Roseate Tern and Marsh Harrier were also noted, a second Marsh Harrier stayed on 9th/10th. The 7th saw the arrival of the first Reed Warbler. Small common migrants continued to arrive in parties until the month end. A Wryneck was noted on 13th, Black Redstart on 14th with Spotted Crake and Wood Warbler on 21st. The 22nd produced a great deal of excitement and within a two-hour period a Montagu's Harrier, Hobby and Rough-legged Buzzard were all observed. Another influx of small migrants on 20th produced 18 Willow Warblers, 3 Lesser Whitethroats, Whitethroat, 2 Garden Warblers, Chiffchaff, 2 Whinchats, 5 Wheatears and Spotted Flycatchers. A Little Gull appeared on 29th with 2 more on 31st. These were joined by a Little Egret which stayed until June 5th on Broad Water and along the River Hun. Late winter visitors included 4 Fieldfares on 7th and Brambling on 14th.

June was rather quiet except for 6 individual Avocets during the first week. One carried a red ring and may have been ringed at Minsmere in 1971. A Marsh Harrier was present on 2nd with 2 more on 10th, Sparrowhawk and Little Gull on 3rd and 5th with 8 Gannets on 14th. 4 Crossbills were recorded on 13th.

By **July** waders were on the move again and Little Gulls were noted between 7th and 23rd. 4 Crossbills appeared in Holme Village on 5th. Arctic Skuas and Gannets appeared frequently from 16th onwards and 2 Red-breasted Mergansers were new on 22nd. The first Curlew-Sandpiper arrived on 29th.

With both wader and sea bird movements increasing **August** also saw the beginning of the return passage of passerines. On the 12th came 6 Pied Flycatchers, 6 Willow Warblers, Wryneck and Redstart and Icterine Warbler on 13th. The first Great Skuas were also seen the same day. A Barred Warbler joined the Icterine on 14th whilst 2 Barred were present on 16th together with a Wryneck. Watching over the sea produced many Gannets on 18th accompanied by Kittiwakes, 3 Manx Shearwaters, 2 Eiders, Long-tailed Duck, many Arctic Skuas and 8 Great Skuas. Little Ringed Plover and Corncrake were notable on 21st. A Long-tailed Skua made the 23rd notable. A passage of Curlew-Sandpipers began August 25th when 55 were present, followed by 50 next day, 17 on September 1st and 40 on 6th. Further influxes of small passerines were noted up to the end of the month and throughout September including totals of 15 Pied Flycatchers, 12 Wrynecks, 30 Whinchats and 6 Barred Warblers between

September 1st and 30th; also small parties of Tree Pipits, Garden Warblers, Willow Warblers, Chiffchaff and Redstarts. An immature Ortolan Bunting was found on 31st.

Autumn movements were in full swing by **September** and an adult Mediterranean Gull passed through on 1st, a party of 30 Black-tailed Godwits were on the shore on 3rd and 2 Black Terns featured on 9th. By the 10th a steady flow of Arctic Skuas and also 22 Great Skuas had been recorded. Richard's Pipit was identified on 6th, 8th and 22nd. Bramblings began arriving from the 16th while a Red-breasted Flycatcher made the 19th interesting. A Yellow-browed Warbler was the highlight for two days from the 27th being joined by an Arctic Redpoll the second day. From the 19th winter birds began returning with daily counts of up to 10 Goldcrests, 6 Song Thrushes and Redwings. Four Snow Buntings came on 23rd. Great Northern Diver and 34 Shelduck to the west on 24th, Ring Ouzel on 29th and Great Grey Shrike on 30th were all notable.

During **October** migration continued almost unbroken to the third week, beginning with single Barred Warbler on 1st and Firecrest on 3rd. The last Whimbrel passed through on 5th. An almost unprecedented fall of Goldcrests with a peak of 200, was recorded on 12th/13th. Two Northern Great Spotted Woodpeckers also landed at this time. Woodcock on 14th was followed next day by single Puffin, 4 Shorelarks, Black Redstart, the outstanding total of 110 Little Gulls and Wryneck (which had been ringed September 25th). The main arrival of Song Thrushes, Redwings, Blackbirds, Chaffinches and Bramblings took place between 1st and 17th. A Crossbill arriving on 16th stayed three days with another on 26th. The 17th produced *the* bird of the autumn: Pallas's Warbler which delighted fortunate observers for 3 days. Summer visitors were still appearing: 2 Whinchats on 2nd, Willow Warbler and Chiffchaff between 1st and 3rd, Garden Warbler and up to 4 Redstarts remained until the 6th with 2 up to the 16th and up to 10 more Blackcaps daily until 15th and odd ones until the month end. 4 Lapland Buntings, Grey Wagtail and 26 Shorelarks were all noted on 19th. 2 Stonechats stayed for most of the month. Seawatching on 20th produced many Great and Pomarine Skuas with hundreds of Kittiwakes. The next day 8 Red-breasted Mergansers appeared. On 28th Hooded Crows peaked at 27 – the best for some years. 10 Little Gulls passed through on 30th with 6 next day.

Apart from flocks of immigrant Fieldfares and Redwings (peaking at 300 an hour) **November** 4th, the only other notable species were 5 Waxwings on 9th and one on 18th, 200 Bewick's Swans flying west on 10th, 8 Shorelarks on 12th and a Blackcap on 16th. 10 Whooper Swans were on the shore on 20th (and again on 31st). Red-necked Grebe, Eiders, Long-tailed Duck and Mergansers concluded the month, leaving **December** to yield 3 Short-eared Owls and 200 Brent Geese, Hen Harrier and 200 Golden Plovers, 16 Pink-footed Geese and 5 Whooper Swans which headed west on 20th. A very late Blackcap was ringed on 28th.

A total of 2,576 birds of 70 species was ringed by Holme Bird Observatory in 1972 (including 1,031 at Titchwell, 182 in the Hunstanton–Docking–Ingoldisthorpe areas and 63 in Old Hunstanton Golf Course bushes). The grand ringing total since 1962 is of 18,974 birds of 126 species. Among those ringed in 1972 were Woodcock, 5 Herring Gulls, 4 Cuckoos, 3 Kingfishers, 4 Great Spotted Woodpeckers, 3 Wrynecks, 60 Swallows, 45 Great, 178 Blue, 9 Willow and 6

Long-tailed Tits, 64 Wrens, 8 Bearded Tits, 93 Fieldfares, 111 Song Thrushes, 3 Ring Ouzels, 184 Blackbirds, 2 Stonechats, 67 Robins, 140 Reed and 107 Sedge Warblers, Icterine Warbler, 75 Blackcaps, 4 Barred and 32 Garden Warblers, 108 Willow Warblers, 22 Chiffchaffs, Yellow-browed and Pallas's Warbler, 195 Goldcrests, 2 Firecrests, 39 Spotted and 30 Pied Flycatchers, 90 Dunnocks, Great Grey Shrike, 350 Greenfinches, 94 Linnets, 106 Redpolls, 36 Bullfinches, Crossbill and 21 Tree Sparrows.

Snettisham Pits Wildfowl Refuge

R.S.P.B.

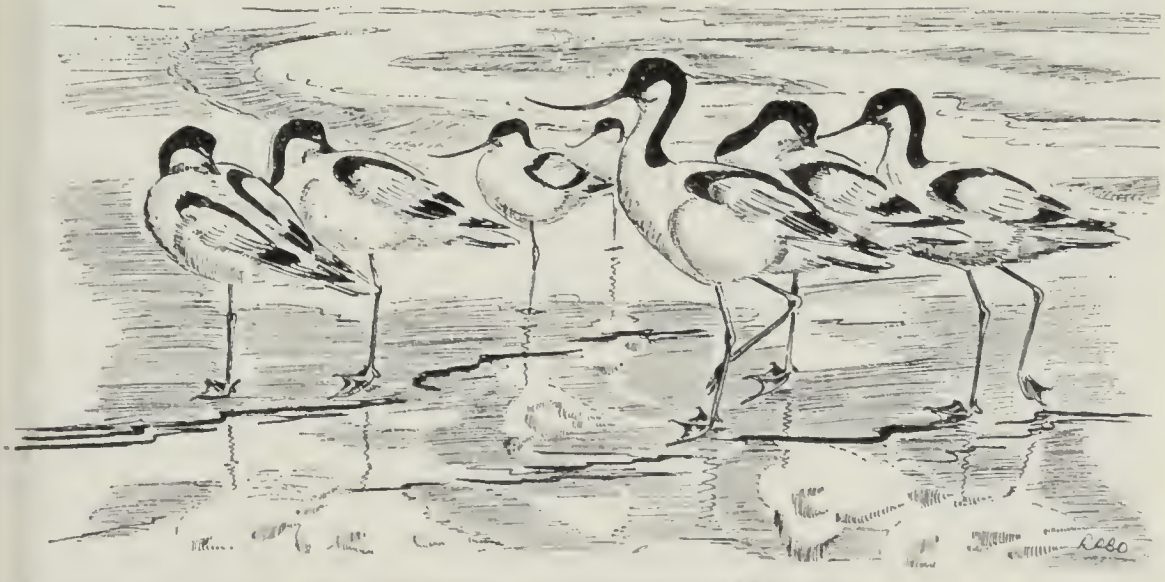
Warden: R. Berry

During **January** a total of 107 Bewick's Swans passed through the Reserve, including herds of 52 on 19th and 41 next day. A company of 40 Red-breasted Mergansers stayed six days from 26th. The 19th was interesting with 5 Smew and a Goosander. A Red-necked Grebe stayed from 5th to 8th when a Black-necked Grebe arrived being joined by a second bird on 17th. Up to 40 Snow Buntings were present all month. Pink-footed Geese peaked at 1,274 on 19th and Goldeneye at 54 on 27th.

In **February** a duck Smew remained until the 26th and a Black-necked Grebe until 22nd. As many as 70 Little Grebes were present and a Red-necked Grebe was detected on three days. Pink-footed Geese had declined to 543 by mid-month. Snow Buntings, surprisingly, increased to a maximum of 117 on 7th. Single Hen Harriers were recorded on 10th and 22nd.

March was exceptionally warm and 13 pairs of Ringed Plovers had established territories by the 7th; between 30 and 40 pairs of Shelduck were displaying. 18 Bewick's Swans passed through on 1st, but the month's highlight was 8 Avocets on 5th. Oiled victims included 2 Red-throated Divers and a Red-necked Grebe. Up to 104 Eiders assembled at Snettisham in the second half of the month. Early spring migrants included Chiffchaff on 18th and Wheatear on 20th.

April was consistently cold and it was not until the 30th that a large scale movement was observed: in two hours 200 Goldfinches, 53 Yellow Wagtails,



Avocets appeared at Snettisham and Breydon in March

100 Swallows and 30 Wood Pigeons passed through. The first Common Terns arrived on 10th when a Sparrowhawk was new. Spotted Redshank and Greenshank were noted on 25th with Purple Sandpiper and Ring Ouzel on 28th.

May visitors included several Montagu's Harriers, Ring Ouzels, 2 Black Terns, Purple Sandpiper on 10th and Little Gull on 13th. Later in the month came Hobby on 18th, Marsh Harrier between 25th and 27th and Spoonbill on 30th. 16 pairs of Ringed Plovers bred on the Reserve hatching 42 young. However, half this total was lost in cold, wet, conditions at the end of the month.

The first brood of 9 baby Shelducks appeared during the first week of **June.** 32 pairs of Common Terns bred rearing 29 young. Over 2,000 Lapwings passed through on 26th and by the month end some 2,000 adult Shelduck has assembled at Wolferton.

By **July** 10th almost 3,000 Shelduck were present near the Reserve. Each evening until the end of the month groups of between 30 and 200 were watched departing on moult migration. Arctic Skuas returned on 26th when 32 Eiders were roosting on the shore.

August was rather quiet apart from Arctic Skuas, Spotted Redshanks, Kingfisher, Little Ringed Plover, Marsh and Montagu's Harriers and Nightjar. Interesting waders at the month end included 6 Curlew-sandpipers, several Little Stints, a remarkable flock of 58 Greenshank and 2 early Jack Snipe.

Two Kingfishers were a daily feature during **September,** together with Nightjar on 2nd, small numbers of Curlew-sandpipers and Common Sandpipers, Wryneck on 10th and Marsh Harrier next day. The month's two highlights were Red-necked Phalarope on 24th and Hoopoe on 19th. 35 Little Grebes had returned by the end of the month when the first 2 Brent Geese appeared. Several hundred Blue Tits passed through a four-day passage in mid-September. The first 5 Fieldfares were recorded on 26th followed by Redwings on 30th.

North to north-westerly gales on **October** 20th brought hundreds of Kittiwakes and Gannets into The Wash at Wolferton; also Arctic and Great Skuas, Little Gull and Long-tailed Duck. The first 17 Bewick's Swans for the autumn arrived on 20th followed by 6 on 22nd and 23 on 23rd. Hundreds, and on occasions thousands, of Fieldfares, Redwings, Starlings, Bramblings and Chaffinches moved through the Reserve each morning. Crows were another October feature and 100 Hooded Crows were recorded. Also of interest were Ring Ouzel and Black Tern on 3rd, 9 White-fronted Geese on 10th, 12 Brents on 13th and Great Grey Shrike next day. By mid-October Scaup, Goldeneye, Tufted and Pochard had assembled, together with 50 Little Grebes and a Merganser. Great Spotted Woodpecker, 5 Siskins, and 14 Bearded Tits were also noteworthy.

A late Wheatear was noted **November** 8th, with Great Grey Shrike and 3 Waxwings on 14th and Merlin and Hen Harrier from the 27th. Shorelarks peaked at 9 and Snow Buntings at between 30 and 40. Among wildfowl 56 Bewick's and 7 Whooper Swans passed through; one of the Whoopers had spent the previous winter here. 60 Pink-footed Geese were present on 15th increasing to just over 500 by the end of the month. In addition to 100 Pochard and Tufted, 25 Goldeneye, 2 Goosanders and 3 Long-tailed Ducks put in an appearance.

During the first week of **December** 13 Bewick's Swans headed towards the Ouse Washes, up to 8 Shorelarks, 70 Snow Buntings and 88 Brent Geese were recorded. Other visitors included Velvet Scoter and 2 Hen Harriers; also 1,000 Pink-feet and 15 White-fronted Geese. At the end of the year 3 Red-throated Divers, Red-necked Grebe, 70 Little Grebes and 150 to 200 Pochard, Tufted and Goldeneye were on show.

Walsey Hills, Salthouse

Norfolk Ornithologists Association

At this Ringing Station a total of 1,260 birds of 59 species was ringed, making a grand total of 4,460 birds of 76 species since 1970. Selected recoveries appear elsewhere in this Report.

Among species ringed in 1972 were Water-Rail, 30 Snipe, 23 Dunlin, 2 Ruffs, 9 Collared Doves, 3 Kingfishers, 41 Swallows, 16 Great Tits, 108 Blue Tits, 8 Willow Tits, 8 Long-tailed Tits, 41 Wrens, 22 Bearded Tits, 37 Song Thrushes, 30 Robins, 107 Reed Warblers, 18 Sedge Warblers, Icterine Warbler, 53 Blackcaps, 2 Barred Warblers, 29 Garden Warblers, 17 Whitethroats, 55 Lesser Whitethroats, 98 Willow Warblers, 19 Chiffchaffs, 40 Goldcrests, 11 Pied Flycatchers, 110 Dunnocks, 23 Greenfinches, 67 Linnets, 38 Redpolls, 13 Bullfinches, 28 Yellowhammers and 22 Tree Sparrows.

Waxham

D. J. Frost and E. L. Williams

Waxham, situated about six miles north of Winterton, comprises an area of coastal dunes bordering on agricultural land. A narrow tract of scrub: hawthorn, oak and sycamore covering the leeward side of the dunes, is the main haunt of migrants moving through the area. The site has been irregularly worked by ringers for a number of years, but in 1972 a more concerted effort by several ringers was possible, with twice weekly visits during September/October.

Although no large-scale autumn passage was recorded (small passage recorded at most Observatories), there was a steady trickle of outgoing migrants during September. October saw the influx of large numbers of Redwing, Fieldfares and Blackbirds and an exceptionally large fall of Goldcrests during the second week. A small late passage of warblers was also recorded during this period. Autumn highlights were Wryneck, Barred Warbler and Ortolan Bunting trapped after the stormy conditions of 17th/18th September; and 2 Firecrests caught with the Goldcrest fall.

First autumn visits were made during the latter half of **August** when small numbers of Pied Flycatchers and Redstarts were moving through. It was a poor autumn for Phylloscopus warblers with only small numbers present during the early part of **September.** There was, however, a good movement of Garden Warblers and Blackcaps during the third week, by which time Pied and Spotted Flycatchers had moved out. Several small falls of Wheatears occurred through the month with smaller numbers of Whinchats and the odd Stonechat. A first year male Ortolan Bunting was trapped on 18th, with Wryneck and Barred Warbler on 19th when the first Redwing appeared. Lesser Whitethroats were more numerous than Whitethroat; a strong southerly passage of Hirundines took place throughout the month.

During **October** there was a small movement of warblers with Whitethroat and Lesser Whitethroat on 1st, Willow Warbler/Chiffchaff on 11th and Reed Warbler and Redstart on 14th. Blackcaps were more numerous during October than in the previous month. Two Firecrests were caught on 1st and 11th, when the first Bramblings were seen. An exceptional fall of Goldcrests occurred during the second week with over 100 ringed. A Short-eared Owl was present on 18th, when

the last Swallow passed through. A steady influx of Continental Blackbirds, Redwings and Fieldfares continued throughout the month, with large numbers feeding on hawthorn berries.

1,200 birds of 41 species were handled during the autumn with 980 ringed. The ringing totals included 2 Kingfishers, Wryneck, 43 Swallows, 27 Great Tits, 74 Blue Tits, 3 Coal Tits, 29 Wrens, 33 Song Thrushes, 35 Redwing, 147 Blackbirds, 25 Redstarts, 52 Robins, 27 Blackcaps, Barred Warbler, 33 Garden Warblers, 5 Whitethroats, 9 Lesser Whitethroats, 11 Willow Warblers, 4 Chiffchaffs, 186 Goldcrests, 2 Firecrests, 2 Spotted Flycatchers, 24 Pied Flycatchers, 81 Dunnocks, 27 Goldfinches, 9 Redpolls, 12 Bullfinches, Ortolan Bunting, 4 Reed Buntings and 7 Tree Sparrows.

Autumn Migrant Totals

	August	September	October
Willow Warbler	2	8	1
Chiffchaff		3	1
Garden Warbler	3	28	2
Blackcap	1	12	14
Lesser Whitethroat	3	5	1
Whitethroat	2	2	1
Redstart	2	22	1
Pied Flycatcher	7	17	
Swallow	3	39	
Goldcrest		25	161
Blackbird	6	20	121
Redwing		2	33

Winterton Dunes

J. G. Goldsmith

Winterton Dunes National Nature Reserve consists of 259 acres of sand dunes and scrub of considerable botanical and geographical interest. During bird migration periods it becomes quite an attractive spot for a wide variety and sometimes considerable quantities of migrants.

Most effort had previously been expended on visible migration studies at Winterton by several observers although some casual ringing had been conducted in the 1960's. In the autumn of 1971 Dr. M. P. Taylor tackled the migration with some ringing studies and has so far been rewarded with a Meadow Pipit from Portugal. This year's study, following Nature Conservancy approval, began at the end of July when efforts were made to locate the most suitable mist-netting spots in the Reserve. Actual ringing began early in September but due to a lack of bird operations ceased in early November. During this period 15 visits were made (chiefly between dawn and mid-day), up to 12 mist-nets were in use at a time and a total of 673 birds of 42 species was ringed. Only on one day (September 20th) did the catch reach treble figures and the average was 45. Only one ringed bird was controlled: a Reed Warbler which had been ringed at Walsey Hills, Cley, a fortnight earlier.

Waders were a feature of **September** 3rd when 3 Curlew-Sandpipers were present, with single Green and Common Sandpipers; Golden Plovers were present in the adjacent fields. The 7th produced an immature Montagu's Harrier; Redstarts and Pied Flycatchers were most numerous between then and the 20th.

During the morning of the 16th, 2 Marsh Harrier passed south before heading out to sea and a third – an adult female – was hunting the northern part of the Reserve. The 20th was peak day for most birds: 14 Continental Robins were caught, together with 13 Reed Warblers, 10 Garden Warblers, 7 Pied Flycatchers and 3 Wheatears. The best bird in the nets was an immature Barred Warbler. A Montagu's Harrier was still present on 23rd when Fieldfares and Golden Plovers were coming in off the sea. 13 "pinging" Bearded Tits passed over high northwards and a Lesser Spotted Woodpecker was new. The 27th was blustery with northerly winds and some numbers of Redwings and Fieldfares were arriving off the sea. Hen Harrier and Merlin both appeared briefly. Two interesting species were caught and ringed: both appearing in the same net – a Wood Warbler and, perhaps our rarest bird of the autumn, a juvenile Yellow-browed Warbler.

Mediterranean Gull, Jack Snipe and Firecrest were all sighted on **October** 3rd. Next day produced the first Shorelarks and Snow Buntings, also 2 Whinchats, 3 Stonechats, 2 Lesser Spotted Woodpeckers and small flocks of Fieldfares and Bramblings. Goldcrests were numerous in the bushes everywhere and a single Firecrest was heard shortly before it was caught. This was the last day Reed Warblers were caught. A Great Grey Shrike was new on 7th, together with 4 Stonechats; a dozen Bearded Tits stopped off in the reeds. An incredibly large number of Reed Buntings was about and 29 were caught. A flock of Linnets was drinking at the Toad pool, one being taken by the Shrike; 11 Meadow Pipits were caught mainly near the pool.

Redpolls were a feature of the 13th/14th with more than 50% composed of the Northern Mealy form *flammea* tending towards *hornemanni*. A roost of several hundred Tree Sparrows gathered in the scrub beside the track nightly. The 14th was the best day for catching Redwing and Blackbirds, Bramblings and Goldcrests. A single juvenile Great Spotted Woodpecker was captured as well as 3 Blackcaps and 2 Garden Warblers. The 15th was good for Bramblings whilst Marsh Harrier, Short-eared Owl and Great Grey Shrike were all sighted. Crossbill and Lapland Bunting were seen and 9 Egyptian Geese headed south. The 21st was very windy, but a sheltered position for the nets was found and 22 Tree Sparrows were caught. A Great Grey Shrike appeared on telegraph wires. The 28th was again good for Reed Buntings, 13 being caught with a further 4 Meadow Pipits which were still numerous on the Reserve, but Goldcrests had begun declining. With such a bright sunny day eyes were kept upwards and a Rough-legged Buzzard was watched circling in from the sea mobbed by 2 Great Black-backed Gulls. It headed about a mile inland before descending in a series of steps to rest in a wood. Hen Harrier and Sparrowhawk were noted on 29th.

Another Hen Harrier bathed in the Toad pool on **November** 4th attended by some 60 protesting Meadow Pipits. A single male Blackcap was recorded, but the bushes were mainly lifeless and only 2 birds were caught.

The year's ringing total included Great Spotted Woodpecker, 10 Swallows, 2 Jays, 14 Great Tits, 44 Blue Tits, 3 Willow Tits, 8 Long-tailed Tits, 25 Wrens, 5 Song Thrushes, 9 Redwing, 36 Blackbirds, 4 Wheatears, 14 Redstarts, 44 Robins, 41 Reed Warblers, 26 Blackcaps, Barred Warbler, 26 Garden Warblers, 2 Whitethroats, 6 Lesser Whitethroats, 13 Willow Warblers, 4 Chiffchaffs, Wood Warbler, Yellow-browed Warbler, 51 Goldcrests, Firecrest, 23 Pied Flycatchers, 36 Dunnocks, 16 Meadow Pipits, 2 Goldfinches, 20 Redpolls, 5 Bullfinches, 11 Chaffinches, 23 Bramblings, 9 Yellowhammers, 78 Reed Buntings and 43 Tree Sparrows.

Bird Ringing Report

With a further increase in the number of recoveries reported, careful selection has been necessary, and more summaries have been included. Recovery patterns for some species may already be well established, but where new ground has been broken, details have been given in full, as under Mute Swan, Bearded Tit, Robin, Redpoll and Brambling.

Detail has had to be most sacrificed for the waders. Space does not allow more than the most spectacular recoveries of Oystercatcher, Knot, Dunlin and Sanderling to be listed. In some cases recoveries are just beginning to come in from sparsely populated areas (Greenland, Iceland and Africa in particular) and the following list omits overseas recoveries that closely fit the table on page 358 of the *Norfolk Bird Report* for 1971. Apart from the Little Ringed Plover, all wader details are taken from the 1972 report of the *Wash Wader Ringing Group*.

Space allows only a brief mention of some long-lived individuals: a Thorpe Blackbird at least eleven years old when found dead; a Grey Plover shot nearly twelve years after ringing; a Dunlin controlled at the same age, and four Knot, all at least eleven years old. Several earlier recoveries are included if for one reason or another they have not previously been published.

Shag

Two pulli from the Isle of May, Fife, in June 1971, were found on Norfolk beaches in February 1972, at Holme and Hunstanton.

Heron

Usual reports came from Norfolk localities in autumn and winter. Others were from further afield, Bucks., Oxon., Yorks. One to Cheshire apparently moved without delay.

Wickhampton (pullus) 16.5.70

Ranworth (pullus), 7.5.72

Sandouville, Seine, France (killed), 4.9.72

Hyde, Cheshire (decomposed remains), 2.8.72

Teal

Four, all shot here in winter, had come from Denmark in May, and from Sweden, Denmark and Netherlands in autumn.

Wigeon

First in the list is a breeding season recovery from Russia, 800 miles north-east of Moscow.

Snettisham, 21.2.70	Ukhta, Komi A.S.S.R., 21.5.72
Snettisham, 1.3.70	Lake Babite, Latvian A.S.S.R., 9.10.71
Snettisham, 22.1.72	North Slob, Co. Wexford, 7.10.72
Briston, 20.8.71	Foulness, Essex, 30.1.72

Mute Swan

Heacham (adult), 8.3.70	Tönning, Schleswig-Holstein, Germany (wires), 13.2.72

Moorhen

Wilhelmshaven, N. Germany, 22.11.70	Gt. Yarmouth, 12.10.72

Oystercatcher

Some thirty movements between the Wash and Norway are mentioned in the latest *W.W.R.G. Report*, the majority being found there between late March and July. Some were as late as October however. Others came from Denmark, Germany, Netherlands and France, with two from the Faeroe Islands in July and August 1972.

Lapwing

Wisbech S.F. (Juv.), 12.9.67	Lesparre, Gironde, France (shot), 13.3.71
Wolferton (adult), 8.11.69	Brovst, Jylland, Denmark (shot), 12.8.72

Ringed Plover

Three ringed on the Wash were controlled in Lancs. The following bird was "caught alive but killed by children protecting rice"! It is the most southerly movement so far recorded from ringing in the U.K.

Snettisham (juv.), 23.9.68	Porto Novo, Dahomey, 28.3.71

Little Ringed Plover

Near Norwich (pullus), 9.7.72	King's Lynn Beet Factory (control), 17.8.72

Turnstone

Singles from Finland and Norway were controlled on the Wash in 1972. Another, from Snettisham, was controlled in Norway, and then caught again at Heacham. The remaining recovery is the first from the Wash to Iceland.

Snettisham, 9.3.69	Skorhagi, Kjosar, Iceland (control), 6.8.72

Snipe

Wisbech S.F., 23.8.69	Astillero, Santander, Spain (shot), 20.10.70
Wisbech S.F., 6.8.66	L'Aber Wrach, Finistere, France (killed), 3.1.71
Wisbech S.F., 8.10.67	Holsworthy, Devon (shot), Jan. 1970 or 1971

Curlew

Overseas recoveries received were: one each to Denmark and Finland, and one from Finland.

Bar-tailed Godwit

Wolferton, 29.8.72	Santander, Spain (shot), 14.10.72

Redshank

Foreign recoveries were from Denmark and Netherlands, and two from Iceland.

Snettisham, 16.2.71	Akureyri, Iceland (killed), 16.5.71
Snettisham, 3.9.67	Hafnarfjordhur, Iceland (control), 25.7.72

Knot

Overseas recoveries of Knot have poured in. Among them, 80 from Iceland, more than half of these being controlled by *W.W.R.G.* expeditions in 1971 and 1972; another 20 from Thule (77°N.), Egedesminde (69°N.), Sukkertoppen (65°N.) and Julianehab (60°N.) in Greenland, all killed. This useful total is thought to reflect greater liaison between trappers and local authorities, rather than increased hunting.

Others were reported in France, Denmark and Norway, and three in the New World.

Snettisham (adult), 27.3.71	Christchurch, Barbados, W. Indies (shot), 16.8.71
Snettisham (adult), 19.3.72	Broughton Is., Baffin Is., Canada (killed), 9.6.72
Snettisham (adult), 19.2.72	Davis Strait, between Greenland and Canada (on fishing boat), 29.5.72

Dunlin

Another steady flow of overseas recoveries, the majority from Sweden, but also from all other countries on the western seaboard of Europe, and including Iceland (1) and Morocco (2). One was dead on a North Sea oil rig. Methods of recovery tend to be "control" in Scandinavia, and "killed by man" in Southern Europe. Foreign ringed birds on the Wash were principally from Scandinavia.

Curlew Sandpiper

Wisbech S.F., 14.8.71	Yyteri, Turku ja Pori, Finland (control), 11.8.72

Sanderling

Three from the Wash were killed in N. France during the summers of 1971/2. Norwegian-ringed birds were controlled on the Wash 19.2.72 and 28.7.72. The other foreign recoveries are given in full, and speak for themselves.

Thornham, 18.9.71	Alger, Algeria (died), 18.2.72
Snettisham, 12.8.68	1. Snettisham (control), 18.7.70 2. Ndangane Sambou, Senegal (taken), 27.9.72
Kommetjie, Cape, S. Africa, 14.3.71	Heacham (control), 15.5.71

Ruff

Wisbech S.F., 23.8.69	Shotton, Flints (control), 6.3.71
Wisbech S.F., 23.8.69	Rieselfelder, Munster, Germany (control), 10.8.72

Common Gull

Lompaala, Hame, Finland (pullus), 27.6.70	Pulham St. Mary (injured, died), 23.1.71

Black Headed Gull

Summer recoveries of Norfolk winter-ringed gulls were from Norway, Sweden, Finland and Denmark; also one from Ipswich in May. Foreign ringed birds came here from Latvia and Poland, and from the Scandinavian breeding areas. One from Finland was still here in May.

Milicz, Poland, 25.5.64
Jokijarvi, Hase, Finland (pullus), 22.6.69
Buxton (adult), 31.12.67
Huutilampi, Oulu, Finland (pullus), 28.6.69
Breydon (dead), 8.4.72
Whitlingham, Norwich (poor condition), 13.5.72
Alborg, Jylland, Denmark (shot at airport), 25.5.72
1. Buxton (control), 11.1.70
2. Siilinjarvi, Kuopio, Finland (dead in musk rat trap), 3.5.72

Sandwich Tern

Breeding birds at Scolt included a small number bearing colour rings indicating that they had been reared either on the Farnes or in Aberdeenshire.

Waddensee, Netherlands (pullus), 7.6.72
Wells (dead on shore), 24.9.72

Cuckoo

Holme (juv.), 13.8.72
San Felice, near Rome, Italy (killed), 25.9.72

Swallow

One of four nestlings from Spurn, Yorks. in July 1971 was found dead below its nest at Cromer, 70 miles away, 1.6.72.

Earlham (adult male), 2.9.68
Leziate (juv.), 26.9.72
Evreux, Eure, France (dead), 4.5.72
Dungeness, Kent (control), 5.10.72

Sand Martin

Although the inquiry into Sand Martin numbers and movements has finished, useful recoveries are still coming to light.

Cley (adult), 14.5.70
Bawburgh (juv.), 17.7.70
Sibculo, Overijssel, Netherlands (control), 16.6.70
Montzen, Liege, Belgium (control), 26.7.72

Bearded Tit

Details appear elsewhere in this Report of the numbers found at various sites in winter. Evidence from birds controlled at these sites suggests Minsmere and Walberswick in Suffolk as the places or origin; but there are Norfolk breeding concentrations that are not worked by ringers, and it is quite likely that these sites also provided a proportion of the winter flocks. A useful double recovery is given in full, as well as our first from the Dutch breeding stronghold. The Snettisham bird apparently wintered near its birthplace. All the following were controlled.

Snettisham (juv.), 18.5.71
Murston, Kent (juv.), 5.6.72
Murston, Kent (juv.), 17.6.72
Kroonspolder, Vlieland, Netherlands, 1.9.72
King's Lynn, 24.12.72
Salthouse, 31.10.72
1. Salthouse, 31.10.72
2. King's Lynn, 4.3.73
King's Lynn, 23.12.72

Fieldfare

Great Plumstead (juv.), 19.11.70	Castagnaro, Verona, Italy (killed), 24.12.71

Song Thrush

An interesting series of data on birds passing through North Norfolk stations.

Heligoland, Germany, 17.4.70	Overstrand (dead), 21.10.70
Kroonspolder, Netherlands, 9.9.71	Cley (killed by cat), Feb. 72
Waxham, 21.9.69	St. Martin sur Buneaux, N. France (taken), 26.3.72
Salthouse, 29.4.71	Viana do Castelo, Portugal (killed), Feb. 72
Salthouse, 1.10.71	Aalst, Belgium (traffic), 13.7.72
Salthouse, 2.10.71	March, Cambs. (hit window), 18.2.72

Redwing

Holme, 5.10.68	Campo Maior, Lisbon, Portugal (killed), 14.2.71
Mintlyn, 27.2.71	Olmo, Burgos, Spain (shot), 15.10.72

Ring Ouzel

Holme, 30.4.70	Valcivieres, France, 6.10.70

Blackbird

Listed here are a Norfolk-bred bird to France and an October immigrant moving on to Wales. Other winter Blackbirds were in Finland, Denmark (3) and Netherlands in spring or summer, and in N. France in January.

Hethersett (juv.), 14.7.68	Ault, Somme, France (killed), 30.12.68
Holme, 15.10.71	Skokholm, Pembroke (control), 27.10.71

Robin

Unreported by the finder for ten years, this bird reached further east, and further south than the area from which migrant Robins are generally known to come.

Cley, 1.10.60	Wyszomierz, Bialystock, Poland (dead under wires), 14.10.61

Reed Warbler

Salthouse (juv.), 13.9.72	Winterton (control), 23.9.72

Blackcap

Listed here is an East Coast migrant apparently wintering in N. France, and an interesting westerly movement across the North Sea.

Salthouse, 15.9.70	Caistor (dead on tide line), 14.5.72
Salthouse, 20.10.71	Aulnoye-Aymeries, France (dead), 11.1.72
Kornerwerderzand, Netherlands 8.10.72	Holme (control), 15 & 17.10.72

Dunnock

Holme, 15.6.66	Beccles, Suffolk (dead), 1.7.72

Meadow Pipit

This movement is typical of the species as shown by ringing.

Winterton, 12.9.71	Figueira da Foz, Beira Litoral, Portugal, 30.1.72

Starling

Netherlands, Germany and Denmark are again represented among recoveries reported for 1972. There are others from Poland (2) and U.S.S.R. (3) including one well north of Moscow, given below. Birds from Hethersett turned up in Yorks, Derbys., Kent and Devon in subsequent winters.

Hethersett, 6.2.69	Barnstaple, Devon (dead) 31.3.70
Hethersett, 1.3.69	Vorob'yevo, Vologda, U.S.S.R., May 1969

Greenfinch

Mintlyn, 20.2.72	Ashover, Derbys. (car), 11.9.72
Mintlyn, 13.3.72	Newbold Vernon, Leics. (car), 30.5.72

Goldfinch

Menen, W. Flanders, Belgium, 16.2.70	Harleston, 22.6.70
Holme, 6.5.70	Fatima, Beira Litoral, Portugal, 28.12.70

Redpoll

Three juveniles from Leziate, ringed autumn 1971, were found at Blickling, Stoke Ferry and Lakenheath in May 1972. Another from Aug. 1970 was caged in Belgium 8.10.71. Recoveries from Germany are few and the movement to Wurttenburg is exceptionally far south.

Leziate, 26.7.71	Stolberg, Aachen, Germany (control), 19.11.72
Leziate, 8.9.71	Tübingen, Sudwurttenburg, Germany, 23.12.72
Titchwell, 19.5.72	Bridgwater, Somerset, 13.11.72

Chaffinch

Rybatchii, Kaliningrad, U.S.S.R., 25.9.67	King's Lynn (dead), 8.2.72
Hersham, Surrey, 9.12.67	Hethersett (control), 28.12.69
Mintlyn, 6.12.69	Bjerregrav, Jutland, Denmark, 3.4.72

Brambling

The first listed is the most easterly recovery of a Brambling to date. Previous summer recoveries have come from Scandinavia, but this suggests the possibility of a Russian population regularly wintering here.

Boughton, 27.2.67	Ukhta, Komi, U.S.S.R. (63°N., 54°E.), 17.5.70
Lindholm, Jutland, Denmark, 21.2.70	Mintlyn (control), 23.1.72
Wassenaar, Netherlands, 25.10.70	Mintlyn (control), 21.2.72
Mintlyn, 24.12.70	Lambourn, Berks. (long dead), 22.11.72
Bawsey, 10.2.71	Peplow, Salop (control), 12.2.72
Mintlyn, 5.12.71	Holsterbro, Jutland, Denmark, 16.4.72

Reed Bunting

This species has seldom been known to move far, though the existence of a passage of Scandinavian birds has been established.

Wissington (juv.), 12.7.70	Chesham, Bucks. (control), 27.12.71

Wash Wader Spectaculars

H. R. Ramsay

Hunstanton Cliffs is a vantage point for one of the most memorable sights in the bird watcher's calendar. Taking place against a backcloth of sea and sky in all their changing moods, the fly-past of waders makes an unforgettable experience. Coinciding with the spring tides around the time of the new and full moons, especially in February/March and September/October this impressive spectacle can be observed.

As the tide rises the Knots, Oystercatchers, Bar-tailed Godwits and other Wash waders leave their muddy feeding areas to the inrushing sea, and flight to their roosting banks at Holme, Thornham and Titchwell where they rest until the ebb. For up to two hours before high water the cliff-top shelters at Hunstanton make ideal grandstands to watch the unfolding of the spectacle.

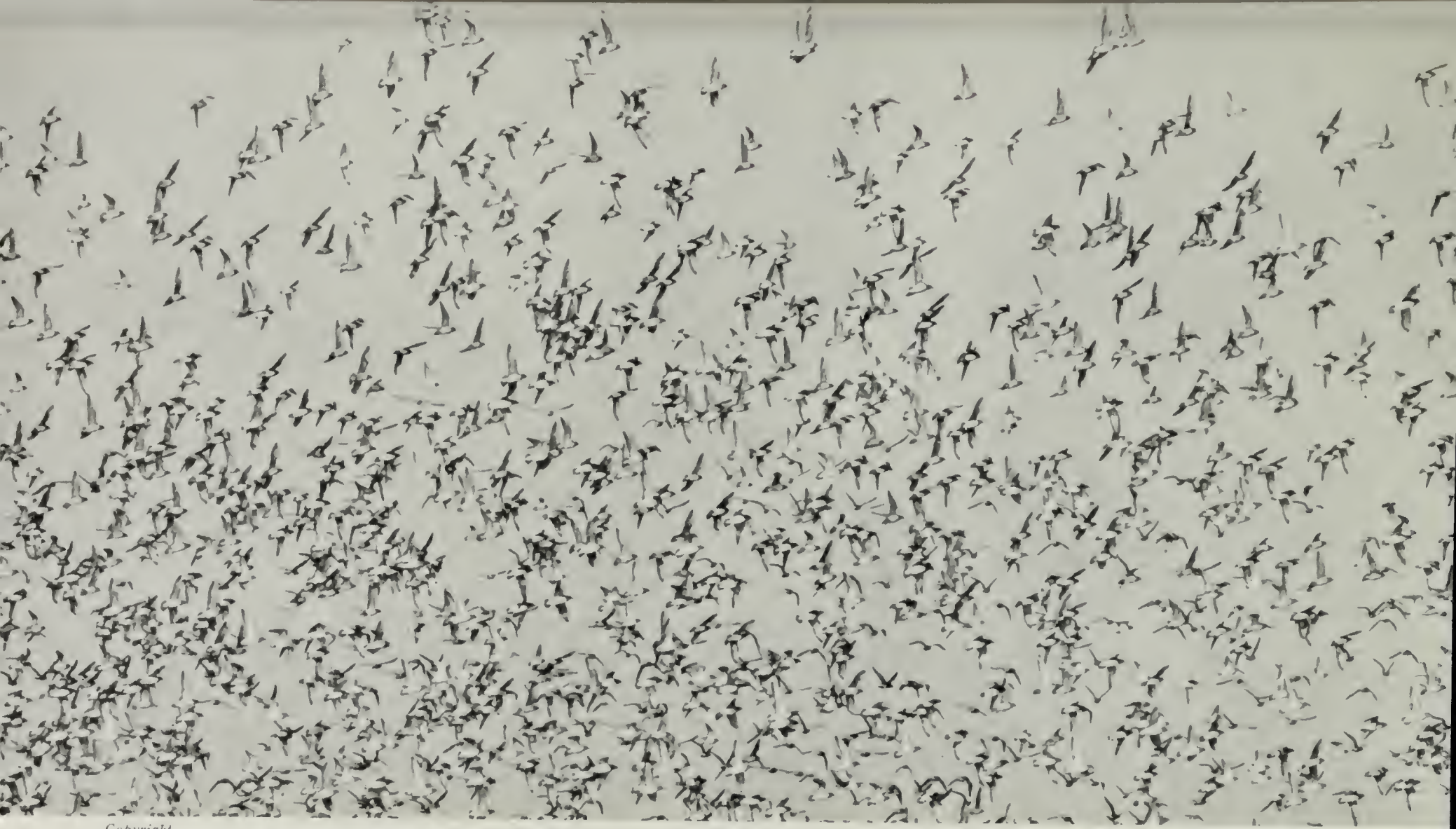
Usually the first indication that the pageant has begun are straight lines of Oystercatchers, often in v-formation, made up of varying numbers of birds, sometimes with several hundreds in one line, seemingly stretching the whole distance across the Wash. Line follows line until the pied thousands have rounded St. Edmund's Point on their way to Holme.

Knots, the most numerous waders on the Wash intersperse the Oystercatcher lines. Travelling in compact, drifting clouds with a clearly etched leading line, the entire population of perhaps more than fifty thousand may pass in only three or four packs, each containing several thousand birds. One such pack has been estimated to number in excess of ten thousand. They appear in the distance as drifting clouds of smoke, but soon each plump body can be discerned being thrust forward by the urgency of sharp wings. In such densely packed groups of such high numbers collisions seem inevitable. From numerous observations it would appear that birds do frequently touch in flight, for from nearly every pack members are suddenly projected upwards from the group, for a short time flying singly above the rest, then adjusting quickly to rejoin the pack.

Many other species of waders are likely to be seen during these tidal movements. Lines of long billed Bar-tailed Godwits, groups of Redshanks, Grey Plovers, Dunlin, Sanderling, Ringed Plovers and Turnstones are the most regular participants.

Whilst most species remain aloof according to their kind for most of the time, there is always the interest of the occasional mixture. Knots, Oystercatchers and Bar-tailed Godwits sharing the same formation, Woodpigeons and loft pigeons on the end of an Oystercatcher line, Little Stint hurrying to keep up with the Knot pack, migrating Wheatears attaching themselves to the movement. These and many more are exhilarating sidelines. A touch of drama was once added when a Merlin scythed swiftly in angled descent through a pack of Knots, scattering them in disarray. A sharp turn cut off five unfortunates, which were pursued beyond the bend of the cliffs, the outcome of the chase being denied the observer.

(continued on page 29)



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Flights of Knot performing high-speed aerial manœuvres provide one of the finest ornithological spectacles. The work of the Wash Wader Ringing Group indicates that the bulk of our population originates in Greenland and not in Siberia as was previously thought.

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W. J. Woolston

The colony of Sandwich Terns at Scolt Head Island increased to a record summer total of 4,800 pairs in 1972. The majority of Sandwich Tern ringing recoveries come from the coast of West Africa with 'globe spanners' penetrating south to Cape Town and to Port Elizabeth.

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Dr. K. J. V. Carlson

Little Ringed Plovers first nested in Norfolk in 1960. Up to 13 pairs have since summered in the county. At two sites the birds share the pools, miniature beaches and shallows with breeding Ringed Plovers. A summer visitor, earliest arrival date is March 22nd, but repeat nests and second broods are frequently reported as late as mid-July.

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David and Katie Urry

Rubbish tips are a great attraction for Black-headed Gulls. Over 80 ringing recoveries indicate that the wintering population comes mainly from birds breeding in Sweden, Finland, Latvian and Estonian S.S.R. with others from Norway, Denmark, U.S.S.R., Germany, Netherlands, Belgium, Poland and Czechoslovakia.

Variations in weather bring many diversions to the normal flighting. Strong headwinds slow down the waders bringing them to sea level, where they are periodically hidden in the troughs of the waves. Following winds accelerate the speed so that flocks are out of sight within seconds. The height of the birds also varies, and whilst the flocks generally keep within viewing distance of the cliffs, high winds or fog can alter the usual pattern. On such days the flight line may be inland, but always closely following the coast. It seems that the birds never take the direct overland route in a straight line north-east, but prefer to change direction through a complete right angle as does the coast leading out of the Wash.

The spectacle of so many thousands of birds in flight has interested many casual cliff-top strollers to stop, stare and wonder. To the devoted observer the pageant never palls.

SUCCESSFUL SCAVENGERS

P. R. Allard

Refuse tips, like old-fashioned sewage farms, are highly attractive to birds, if not to some bird-watchers! The Yarmouth (Cobholm) tip is no exception. It was opened in the mid 1950's adjoining the south bank of Breydon Water in order to reinforce the existing flood protection wall which had been seriously breached in the 1953 tidal surge.

The tip has in recent years considerably increased in size and at one time there was a threat to extend it along the entire south bank to Burgh Castle. Soon after opening, Yarmouth tip began attracting thousands of gulls. The numbers present reminded observers of the heyday of the East Anglian autumn herring fishing when the wharves swarmed with gulls seeking fish. At present (summer 1973) part of Yarmouth's refuse is handled at Caister but the gulls remain, resting for long periods on the adjoining playing fields. At its winter peak thousands of Black-headed Gulls, with smaller numbers of Common Gulls, are an every-day sight waiting for the lorries to move off to collect further loads.

Great Black-backed and Herring Gulls are also part of the scene; many hundreds are often in evidence particularly during stormy weather. A few Lesser Black-backed Gulls appear, usually in early autumn. During the last few years bird observations in the Yarmouth area have greatly increased and up to four Glaucous Gulls at one time have been detected. The majority have been immatures between September and February, but fine adults have also turned up; one stayed many weeks and becoming quite tame.

Rooks and Jackdaws are abundant and there is a regular early morning/evening flight of Rooks from the extensive Mautby Rookery passing over Breydon to the tip during the summer; others come from Burgh Castle and Yarmouth (St. Nicholas churchyard) Rookeries. Up to 30 Hooded Crows are present from October to April. Kestrels are usually on view and in the evenings Short-eared Owls hunt the area.

The system of controlled tipping at Yarmouth has produced sandy areas which provide nesting sites for both Ringed Plovers and Oystercatchers. Linnets and Skylarks also breed regularly and Corn Bunting nested for the first time in 1973. The area is intersected with dykes which are heavily polluted; despite this Moorhens breed with no apparent ill-effect. After heavy rains one area provides an ideal wader habitat and among the species indentified have been Little Stint, Curlew-Sandpiper and Little Ringed Plover.

Classified notes

These notes are based on *Birds of Norfolk* (1967) where fuller details regarding status, distribution, migration and ringing recoveries may be found. Important records for Wisbech Sewage Farm (part of which is on the Lincolnshire side of the county boundary) have been selected from the files of Cambridge Bird Club. Fullers details of Wash and Fen records may be found in the *Cambridge Bird Club Report* for 1972.

The order used is that of the B.T.O. guide *A Species List of British and Irish Birds* (1971) and English names follow current practice. Observations refer to 1972, unless otherwise stated. To save space, all but the most essential initials have been omitted. Records are of *single* birds unless otherwise stated.

Great-crested Grebe: The results of a full county survey will be published in the 1973 Report.

Red-necked Grebe: Wash/North coast: Singles at Snettisham, Hunstanton, Holme, Brancaster, Wells, Blakeney Point, Cley, Salthouse and Weybourne up to April 30th and from Aug. 20th. East: Horsey Gap, April 30th. Inland: Intwood, dead, Dec. 19th.

Slavonian Grebe: Wash/North coast: Up to 6 off Hunstanton, with ones and twos at Snettisham, Heacham, Holme, Wells and Cley up to March 5th and from Oct. 15th. East: Breydon Feb. 13th.

Black-necked Grebe: Wash/North: Ones and twos, and once 6, at Snettisham, Hunstanton, Burnham Overy, Holkham Lake and Cley up to Feb. 26th and from Sept. 6th. Breck: Lang Mere Feb. 20th.

Fulmar: North: A total of 51 young was counted in Aug. on cliff ledges between Weybourne and Cromer (JM); the first birds returned Nov. 14th. Wash: Hunstanton, 22 pairs present in early April and 5 young left the ledges; 2 returned Dec. 9th.

Manx Shearwater: North: Apart from a movement totalling 50 birds off Gore Point Aug. 2nd, frequent autumn movements of up to 4 together between mid July and end of Oct. A bird of the Balearic race *mauretanicus* off Weybourne July 22nd.

Great Shearwater: North: Weybourne 2 Aug. 18th (DFM), Cley Sept. 22nd (RPB-O) and Oct. 27th (RPM).

Sooty Shearwater: North (Holme to Sheringham): Total of 20 between July 26th and Oct. 21st. East: Winterton 4 Sept. 25th.

Storm Petrel: East: Stranded birds taken to Yarmouth Oct. 10th and Dec. 11th; the latter had been caught on a gas platform 27 miles NE of Yarmouth.

Leach's Petrel: North: Cley and Holme Sept. 14th, Weybourne Oct. 21st and 4 off Yarmouth Nov. 19th.

Cormorant: East: Peak count at Breydon was 116 Feb. 14th. The same day total of 202 assembled to roost in alders edging Ranworth Inner Broad.

Shag: Coastal records between Snettisham and Weybourne with maximum of 11 off Hunstanton where 3 roosting on cliffs in Jan.–Feb. Inland: Blickling Lake Dec. 15th to 30th.

Grey Heron: The following heronries were counted:

Borders of Wash: Snettisham 19 nests. Fens: Hilgay 10, Islington 63, and Denver Sluice 17.

Breck: Didlington 9, Shadwell 7, and Narford 16.

Mid-Norfolk: Kimberley Park 18, Beetley Hall 1 and Colney 2.

Broads: McHardy's Wood 4, Heigham Sounds 21, Waggonhill Wood 3, Wickhampton 20, Buckenham 37, Strumpshaw 5, Mautby Decoy 5, Ranworth 10, Ranworth Marshes (Horning Hall) 10, Barton (Heron's Carr) 13, Wheatfen 7, Upton 3, Belaugh 1 and Wroxham 1.

North: Cley 4.

South: Billingford (Thorpe Wood) 4.

Little Egret: A remarkable spring influx of at least 6 to the county. North: Cley, one arrived April 30th staying till May 7th; another arrived May 28th and was joined by a second bird on 29th/30th; a fourth (immature) came June 2nd remaining till July 12th. Holme, immature May 28th to June 5th. East: Breydon, May 4th to 8th.

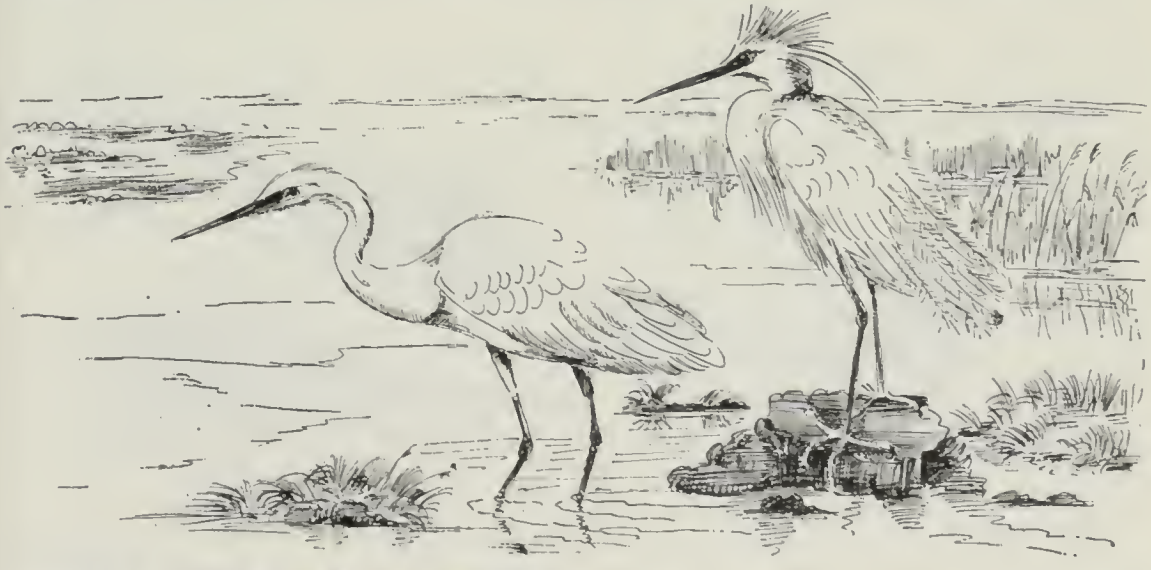
Night Heron: Broads: Black Horse Broad, adult, May 25th (CSG). Central: Swanton Morely G.P., immature Sept. 25th to Nov. 12th (KE, GR, AJS *et al*).

Bittern: North: Cley, pair bred successfully. Breck: Autumn-winter records at Tottington, East Wretham, Stanford, Buckenham Tofts, Starston, Thompson and Rush Mere.

White Stork: North: Cley May 7th (JR).

Spoonbill: Wash/North/East coasts/Broads: Ones and twos at Snettisham, Cley, Martham, Horsey, Hickling, Hardley, Breydon and Yarmouth between May 2nd and Aug. 13th; in addition parties of 4 and 5 at Hickling (June 18th and 28th) and 5 heading east over Yarmouth July 25th.

Garganey: Spring arrival from March 20th and subsequently at 10 localities.



At least six Little Egrets were recorded

Blue-winged Teal: Broads: Hardley Flood, drake, Jan. 1st to March 12th and Nov. 5th to 26th (CRG *et al*).
Gadwall: Largest Breck counts include 300 at Mickle Mere Oct. 15th, 280 at Stanford on 22nd and 90 at Didlington Dec. 3rd.
Pintail: Breck: Increasing numbers (up to 16 together) at Stanford, Shadwell and Mickle Mere.
Shoveler: Breck: Counts include 53 at Mickle Mere March 25th.
Red-crested Pochard: Broads: Breydon drake Feb. 5th (MB); Wroxham, drake, mid-Nov. (*per* EAE).
Tufted Duck: Breeding records: 28 pairs bred in Brecks at 10 sites; elsewhere a minimum of 40 pairs bred at 17 sites.
Pochard: Breeding records: 5 pairs known to have bred in Brecks at 3 sites; elsewhere 13 pairs bred at 11 sites.
Ferruginous Duck: Broads: Hardley Flood drake Dec. 30th (CRG).
Goldeneye: N/E coast: Larger counts include 30 on Abraham's Bosom Wells, 70 at Berney Arms, 65 at Scolt Head; also 110 west at Cley in 2¾ hours Nov. 18th.
Long-tailed Duck: Wash: Hunstanton monthly maxima as follows: Jan. 19, Feb. 30, March 12, April 6, Nov. 12 and Dec. 51.

North coast: Occasional records of up to 10 till April 9th and up to 5 from Aug. 18th.

East: Gorleston, 5 Nov. 22nd increasing to 10 between Dec. 24th and 31st.

Wash: Snettisham, 1–3 from Nov. 25th onwards.

Velvet Scoter: Wash/North coasts: Recorded March to May and July to Nov.; mostly ones, twos and threes with largest party totalling 7. East: Gorleston unusual numbers including 30 in Jan., 102 Nov. 9th, 62 on 11th and up to 20 till year end. Inland: Swanton Morley G.P. Nov. 20th to Dec. 10th.
Common Scoter: N/E coasts: Largest flights were 500 off Gorleston and 200 off Hunstanton. Broads: Barton Sept. 3rd. Fens: Saddlebow to Wiggenhall Relief Channel, 3 July 28th.
Eider: Recorded each month. Largest flocks for main localities only are given: East: Gorleston 71 Feb. 13th (42 remained March 27th). North: Scolt Head 70 Feb. 13th and Hunstanton 121 Jan. 2nd till Feb. 6th. Wash: Snettisham 87 March 15th and 104 on 20th.

Blue-winged Teal with Shovelers at Hardley Flood

Red-breasted Merganser: Largest number on the Wash with totals of 131 between Holme and Snettisham Feb. 6th and 50 between Hunstanton and Snettisham on 26th.

Goosander: Winter observations from 23 localities with peak numbers in mid-Feb. when 13 at Narborough G.P., 20 at Stradsett and 20 at Gunton Park.

Smew: Winter records at 6 sites with maximum of 5 at Snettisham.

Shelduck: An interesting series of moult migration records. On the Wash over 3000 had assembled off Snettisham on July 10th and each fine evening until the month-end groups of between 30 and 200 departed. In addition 2000 were present on Upper Middle and Bulldog Sands from July 12th.

Elsewhere two flights totalling 100 moved east at Blakeney Point July 22nd with others passing on 24th and 27th; 30 headed east off Cley July 18th with 58 east in two hours at Weybourne on 22nd. 19 flew east at Winterton July 16th and 15 east over Yarmouth June 25th.

As an indication of Wash breeding success 230 young had collected at Lynn Point at the end of June.

Egyptian Goose: Reported at Blickling, Didlington, Felbrigg, Gunton, Hillington, Holkham, Houghton, Lenwade G.P., Narborough G.P., Narford, Salhouse, Swanton Morley G.P., West Acre and West Newton.

White-fronted Goose: East: Breydon area, maximum of 75 from end of Jan. to end of Feb.; 3 returned Dec. 26th with 29 by 31st. North: Cley, peak of 31 Jan. 23rd. Holkham, present from mid-Jan. to Feb. 20th with total of 129; 70 returned by Dec. 24th. Fens: Welney, 12 in Jan. and 23 in Dec.

Bean Goose: East: Up to 67 in the usual area till March 12th; 36 returned Nov. 21st (earliest arrival date recorded) and 45 from Dec. 2nd. North/Fens: Ones and twos in Jan.–Feb.

Pink-footed Goose: East: Only a single observation: 6 near Breydon Jan. 29th. Wash: Snettisham area Jan. maximum of 1274 (19th); 60 returned Nov. 15th, increasing to 287 by 26th and over 500 by 30th with 1000 Dec. 22nd.

Brent Goose: Recorded up to April 13th and from Sept. 24th. Maximum numbers at regular localities as follows: Salthouse 195, Blakeney–Morston 1500, Wells 750, Brancaster 1000 (not including 100–125 young) and Hunstanton–Heacham 293.

Barnacle Goose: North: Holme March 31st, Sheringham 18 west Oct. 21st and Weybourne 12 Nov. 5th.

Whooper Swan: Winter records at 9 localities with largest herds at Welney where 31 in Jan.–Feb. and 21 by end of year.

Bewick's Swans: Recorded at usual localities up to March 21st and from Oct. 20th. Largest numbers on Welney Washes where 400 through Jan. reaching peak of 550 in late Feb. These birds were part of the record herd of 1280 wintering on the Ouse Washes. 540 had returned to Welney by the year end.

Elsewhere largest concentrations at Haddiscoe (97) and Halvergate–Breydon (46). Jan. movements at Snettisham totalled 107 including a herd of 52. Easterly spring exodus noted at Sheringham were 50–60 March 2nd; and at Thornham, Titchwell and Brancaster where herds of 30, 50 and 70 respectively between March 19th and 21st.

Westerly winter passage birds well documented (peak days Nov. 9th–10th); Cley 32 Nov. 1st and 14 on 18th; Hunstanton 22 south-west Nov. 19th and 12 west Dec. 30th; Snettisham 56 during Nov.; Wells 33 west Nov. 10th; West Runton 10 west Nov. 9th; Holme 200 Nov. 10th and Norwich 17 north-west Nov. 24th.

Buzzard: Ones and twos at 8 localities between March and Oct. In addition a 1971 bird near Sandringham lingered until March 12 when it was joined by a second bird and aerial display observed. Unfortunately both birds left the area soon after.

Rough-legged Buzzard: Singles at Bintree, Cley, East Wretham, Holme, Roydon Common, Sandringham, West Mere, Tottington and Winterton. Recorded up to May 22nd and from Oct. 23rd.

Sparrowhawk: Records from 51 localities, but only known to have bred at 3 sites.

Goshawk: Breck: Munford Aug. 12th (RPB-O). West: Grimston, an immature bird found dead Nov. 20th (*per* GJ) – Now in Norwich Castle Museum.

Red Kite: East: Horsey June 9th (AJL) and Acle Sept. 26th (*per* EAE). North: Wells female found dead March 23rd now in Norwich Castle Museum (CJJ); Cley Dec. 31st (EF). Central: Old Buckenham Dec. 17th (DAD, EMD). West: Gaywood March 30th (*per* PRC).

Birds of Norfolk (1967) indicates a twentieth century county total of 10 Red Kites (none was recorded between 1882 and 1957). Since publication a further 13 have been reported (including 1972 occurrences). Those appearing here in spring are considered to be Continental birds deflected west of their normal route. Autumn and winter observations are more likely to relate to wandering Welsh birds.

Honey Buzzard: North: Singles at 5 localities between May 7th and Sept. 6th.

Marsh Harrier: Broads: Hickling, Horsey and Martham, ones and twos throughout the year. Frequent coastal observations (including Wash) of singles in spring/autumn.

Hen Harrier: Recorded up to April 5th and from Oct. 15th at many coastal sites including Wash and also at Roydon Common and in Brecks. Majority of records relate to singles, but 3 together at Roydon Common and 4 at both Horsey and in the King's Lynn–Wolferton–Snettisham area.

Montagu's Harrier: North: At the site occupied in 1970 and 1971 the first bird returned April 30th and 4 young reached the flying stage. During the breeding season a total of 2 males and 3 females was present.

Elsewhere ones and twos in Fens (Wisbech S.F.), Wash (Wolferton and Snettisham), N/E coasts and in Brecks between April 30th and Sept. 23rd.

Osprey: At least 4 birds at Blakeney Point, Brancaster, Cley, Mickle Mere, Sparham and Titchwell. Extreme dates May 21st to Sept. 24th.

Hobby: Total of 13 between May 1st and Aug. 29th at 11 localities.

Peregrine: Total of 8 at 7 coastal localities.

Quail: Summer records from Binham, Blakeney, Foxley-Billingford, Swanton Morley (4 calling), Trunch and Wereham.

Golden Pheasant: Brecks: Recorded at Croxton, Grimes Graves, Santon Downham, Shadwell, Weeting Heath and West Tofts.

Spotted Crake: Singles at Breydon, Cley, Holme, Wells, Wheatfen and Wisbech S.F. up to May 21st and from Sept. 11th.

Corncrake: Birds calling at Didlington in May and at Egmere in first half of June. Migrants at Holme Aug. 21st and at Titchwell on 25th.

Oystercatcher: Breeding records of *pairs:*

East: Breydon area 9 (including 4 on north wall marshes and one on refuse tip).

Broads: Horsey 2, East Somerton one.

North: Weybourne 2, Blakeney Point 120–130, Stiffkey Binks 10, Scolt Head 150–155, and Brancaster Golf Course 3.

Inland nesting at Snoring, Thornage, Thursford and Hindringham (one pair at each locality).

Ringed Plover: Breeding records of *pairs* include:
Broads: Hickling 2.
East: Winterton to Horsey 8.
North: Blakeney Point 180, Stiffkey Binks 12, Scolt Head 160, Brancaster Golf Course 4. Inland nesting at Warham (in sugar beet field).
Wash: Snettisham 16.
Breck: West Harling one.
Fen border: Bawsey Mintlyn one and Pentney 2.
Fens: Wisbech S.F. one.
Little Ringed Plover: *Breeding:*
Central: 5 pairs present at 4 sites – all were successful.
Fen border: Total of 4 pairs at 2 sites and 8 young reared.
Passage migrants at usual localities between April 3rd (Lang Mere and Grimston) and Sept. 30th with up to 6 at Wisbech S.F. and 8 at Colney in autumn.
Kentish Plover: North: Cley, at least 4 appeared: May 7th–8th, 13th–20th and 28th to June 2nd and also Aug. 9th.
Golden Plover: Traditional wintering flocks of up to 400 at Breydon, Boughton, Cawston–Oulton, Foxley, Saxthorpe, Stoke Ferry and Swannington. Peak assembly of 2500 at Holme Oct. 24th.
Dotterel: East: Paston cliffs May 19th, Horsey 2 23rd–24th, Hempstead with Eccles May 21st.
North: Holkham 2 April 22nd and Sheringham Aug. 29th. Fens: Wisbech S.F. Aug. 31st and Sept. 29th with Golden Plovers.
Turnstone: Wash: Interesting winter observations at Hunstanton cliff-top where one regularly accepted cheese for second winter in succession and at Ouse Mouth where up to 20 roosting on buoy in fog.
Black-tailed Godwit: Breeding: Fens: Ouse Washes (complete length including Cambs.), at least 65 pairs and perhaps 90 young fledged. Amongst this impressive total were 4 pairs at Welney. North: Cley, 2 pairs present from March 10th, but no breeding success.
Passage movements include 16 at Terrington July 1st, up to 8 at Wisbech S.F. mid-July, 30 on shore at Holme Sept. 3rd and 10 at Cley Oct. 21st.
Green Sandpiper: Peak numbers at Cantley B.F. where 12 July 2nd increasing to 35 by 24th.
Wood Sandpiper: Autumn passage between July 1st and Oct. 14th, but no more than 3 together.
Common Sandpiper: Fens: Present at Wisbech S.F. between July 9th and Oct. 2nd with maximum of 64 Aug. 24th.
Spotted Redshank: Inland observations of singles at Lang Mere Aug. 27th and at Swanton Morley G.P. on 28th and on Sept. 17th. Fens: Wisbech S.F. maximum 14 Oct. 20th.
Greenshank: North: Morston, one wintered until Feb. 8th. Wash: Snettisham assembly of 58 at end of Aug.
Purple Sandpiper: North coast/Wash: Recorded each month (except June). Localities as follows: Blakeney 1, Cley 1, Heacham 7, Holme 3, Hunstanton 6, Salthouse 2, Sheringham 2, Snettisham 1, Titchwell 1, Wells 1 and Weybourne 4.
Little Stint: Fens: Autumn passage well documented at Wisbech S.F. where present between Aug. 1st and Oct. 28th with Sept. peak of 18 (on 23rd) and Oct. peak of 14 (on 3rd).
Temminck's Stint: Fens: Wisbech S.F. single bird(s) almost daily between Aug. 24th and Sept. 9th.

North: Cley, between 1 and 3 on 11 dates May 6th–24th; singles Aug. 6th–9th and 21st with 2 on 14th.

White-rumped Sandpiper: North: Cley Oct. 14th (ALB, DW). Eight previous county records.

Pectoral Sandpiper: Fens: Wisbech S.F. July 15th–23rd. North: Cley Sept. 14th–20th

Curlew Sandpiper: North: Cley area, groups of 2 and 3 June 3rd with autumn passage between July 17th and Oct. 17th (peak of 40 Sept. 3rd). East: Waxham 17 Sept. 10th.

Fens: Wisbech S.F. present between July 20th and Oct. 21st with main influxes July 26th (30) and between Aug. 31st and Sept. 11th (up to 40 daily).

Ruff: Breeding: Fens, Ouse Washes (complete length including Cambs.) only 5 Reeves apparently nested including 2 at Welney.

Usual passage records; present at Cley all year including 8 during Dec. At Wisbech S.F. autumn monthly maxima as follows: July 70, Aug. 45, Sept. 60, Oct. 90 and Nov. 25. On Ouse Washes (complete) largest numbers in early months: 110 in Jan., 106 in Feb. and 112 in March.

Avocet: An interesting mid-winter record with marked influx in early June.

East: Breydon, one March 19th with 8 on 25th, singles on 4 occasions April–May, 2 to 4 between June 5th and 16th, one on 30th, 2–3 between Aug. 5th and 13th and 7 on 30th.

Broads: Hardley 2 June 11th. Hickling 3 June 12th.

North: Cley one March 18th followed by singles in April–May with up to 7 between June 7th and 11th. Morston–Stiffkey one April 5th–10th, 2 May 10th–19th and between 24th and 28th with 5 June 10th. Holme 2 Jan 1st with 6 during the first week of June including one with a red ring probably ringed as a youngster at Minsmere in 1971.

Wash: Snettisham 8 March 5th.

Grey Phalarope: An autumn total of 11 birds.

Broads: Barton Nov. 18th.

North: Sheringham Sept. 26th/29th, Weybourne Sept. 3rd and 30th, Oct. 21st/22nd, Nov. 15th and 18th. Cley/Salthouse Sept. 12th–14th with 2 Oct. 21st/22nd. Holme Nov. 24th.

Red-necked Phalarope: Broads: Hickling Aug. 24th. North: Weybourne Aug. 6th. Wash: Snettisham Sept. 24th. Fens: Wisbech S.F. Aug. 12th with another between 16th and 24th; Tottenhill G.P. Aug. 15th to 24th.

Stone Curlew: In Brecks returned from March 19th and breeding season records from 14 localities; autumn gathering of 30 at Gooderstone.

North: 2 pairs bred successfully on a disused aerodrome. Wash border: one pair reared young.

Great Skua: East: Winterton Aug. 28th and Oct. 13th.

North: Autumn passage between July 26th and Nov. 24th with largest movements Sept. 9th (when 24 entering Wash at Holme) 17th (10 west at Weybourne) and Oct. 20th (15 east at Weybourne).

Wash: Snettisham 2 Aug. 29th and 2 Oct. 7th. Terrington Sept. 18th 20 present of whom 4 crossed over sea wall heading S.W.; still visible when 5 miles inland.

Pomarine Skua: North coast: Autumn (Aug. 13th to Nov. 24th) total of 133 birds including groups of 10, 13 and 22.

Wash: Terrington Sept. 18th.

Arctic Skua: North/East coasts: Autumn movements between July 23rd and Nov. 24th; in addition one off Sheringham June 20th. Largest groups off Weybourne (24), Cley (34), Hunstanton (40) and Holme (42).

Wash: Wolferton 6 Aug. 13th, Terrington 30 moving inland and 8 moving north Sept. 18th.

Inland: Holt–Fakenham road, one scavenging rabbit corpse Sept. 22nd.

Long-tailed Skua: North coast: Singles on eight dates between July 23rd and Sept. 26th.

Herring Gull: North: Blakeney Point a pair bred rearing 3 chicks. First county breeding record.

Common Gull: North: Blakeney Point one pair reared 2 chicks. Scolt 3 pairs displaying and one unsuccessful nest.

Glaucous Gull: North coast (especially Blakeney Point to Weybourne): Ones and twos on many dates up to March 24th and between Aug. 22nd and end of the year.

East: Yarmouth harbour noted in Jan., Oct. and Nov. Wash: Heacham Feb. 26th. Inland: Harford tip Nov. 1st.

Iceland Gull: North: Hunstanton Nov. 19th (DIR).

Mediterranean Gull: East: Yarmouth Aug. 5th to Oct. 13th (PRA) and Winterton Oct. 3rd (JGG, BWJ). North: Weybourne, at least 5 probably 7 July 28th to Oct. 15th (DFM). Blakeney Point one long dead Feb. 13th. Wells Sept. 30th (GED), Holme Sept. 1st (HBO) and Hunstanton Nov. 12th (HRR). Wash: Heacham July 23rd (PJ).

Little Gull: North/East coasts/Wash: Recorded all months except Dec. with numerous Oct.–Nov. observations. Mostly either singles or small parties up to 10, but 14 at Weybourne Aug. 13th, 26 off Gore Point Oct. 7th, 35 (only 4 adults) at Hunstanton on 28th, 23 at Weybourne Nov. 18th and remarkable assembly totalling 110 off Holme Oct. 15th.

Inland records of singles at Haddiscoe G.P., Norwich (Harford tip), Seamere and Selbrigg.

Black-headed Gull: Numbers of *pairs* at breeding sites include: North: Scolt 400 and Stiffkey Binks 20. Broads: Horsey 50 and Alderfen only 2.

Gulls following ploughs are a familiar winter feature; it would be interesting to learn if many become casualties through being trapped in furrows. 4 such victims were reported from Binham and Haveringland in 1972.

Kittiwake: Breeding attempt again made at a cliff-site in N.E. Norfolk: 3 nests but no eggs laid.

Largest weather movement noted Oct. 20th (N.W. gale) when easterly passage involving several thousands visible off West Runton. Impressive summer assembly at Scroby Sands peaked at 5100 at end of June.

Black Tern: Passage migrants at usual localities between May 1st and Oct. 7th. Largest spring parties during third week of May when 6 at Rockland and 9 at Breydon. Autumn passage on even smaller scale.

Gull-billed Tern: North: Weybourne to Blakeney Point Aug. 27th to Sept. 3rd.

Common Tern: Numbers of *pairs* at breeding sites:

Wash: Snettisham 32.

North: Scolt 600, Stiffkey Binks 135, Blakeney Point 1700–1900, Titchwell 5, Brancaster 3 and Cley (Arnold's Marsh) 9. East: Scroby Sands small colony but no figures available. Broads: Ranworth 43, Hickling 3, Ormesby 10, Barton one, Catfield Fen 2 and Hardley Flood 4. Inland: Bawburgh–Colney G.P. 3 and Swanton Morley 2.

Arctic Tern: North: Breeding *pairs:* Scolt one and Blakeney Point 2. Late date Oct. 21st (Weybourne).

Roseate Tern: North: None bred, but singles between Holme and Weybourne May 6th and Aug. 20th.

Long Eared Owls bred at two locations

Little Tern: Breeding records of *pairs* include: North: Titchwell 20, Scolt Head 70, Brancaster 7 (no young reared), Blakeney Point 200–220, Stiffkey Binks 12 and Cley 4.

East: Winterton/Horsey 90 (13 flying young) and Winterton/Hemsby 3 (no young reared).

Last dates Sept. 17th and 24th at Weybourne.

Sandwich Tern: North: Scolt, record breeding colony of 4800 pairs. Stiffkey Binks 350 pairs. Extreme dates March 31st and Oct. 21st.

Little Auk: North: Brancaster G.C. one dead Jan. 4th. Weybourne 6 singles between Oct. 14th and Nov. 24th.

Black Guillemot: North: 5 singles in Jan., April, Oct. and Nov.

Puffin: North: 1–6 on 18 dates between Sept. and Nov.; also one July 23rd.

Turtle Dove: Notable observations include up to 1000 passing Titchwell in a single day in late May and 100 at Crimplesham G.P. in June. Late dates: Cley Oct. 1st and Weybourne Nov. 11th.

Collared Dove: Largest concentrations include 140 at Downham Market silos July 28th and 100 Carrow Works Norwich end of Feb.

Monthly maxima at Broom Hill, East Runton: Jan. 58, Feb. 54, March 57, April 50, May 59, June 52, July 47, Aug. 43, Sept. 25, Oct. 26, Nov. 33 and Dec. 30 (GRC). Decline in numbers thought to be due to presence of up to 6 Magpies.

Barn Owl: Reported from 75 localities. Road casualties include 5 killed on A.47 between Yarmouth and "Stracey Arms".

Little Owl: Reported from 22 localities.

Long-eared Owl: Bred successfully at East Wretham Heath and at Hickling. Single records from Blakeney, Felthorpe, Norwich (Castle Mound), Salthouse Heath, Taverham and Wells.

Short-eared Owl: Breeding records: Single pairs at Wickhampton, Breydon, Blakeney fresh-marshes and Holme.

Wintering birds most abundant in S.E. Norfolk, particularly at Halvergate where 30 Dec. 9th and high total of 116 on 24th including 80 in air together. In North, a winter roost of 15 in Docking railway cutting.

Nightjar: Majority of records from Breck; in addition small colonies at Horsford, Salthouse and Kelling Heaths and Roydon Common.

Swift: Unusual nesting site, Hunstanton cliffs, at least one pair. October records at Reepham (18th) and Caister-on-Sea (29th).

Kingfisher: Recorded at 56 localities including a Gorleston garden pool, Quayside and Bishop Bridge Norwich and Snettisham where 2 south-west Oct. 15th.

Hoopoe: Total of 9 as follows: North: Blakeney–Cley April 18th/20th and Sept. 5th, Salthouse June 30th, and Warham Sept. 18th.

East: Ormesby Sept. 1st to 10th, Breydon on 12th and Surlingham April 8th/9th. South: Dickleburgh June 28th. Wash: Snettisham Sept. 19th.

Great Spotted Woodpecker: North (Blakeney Point, Holkham–Wells, Holme, Hunstanton and Wells). East (Winterton) and Wash (Snettisham and Heacham). Between Sept. 16th and Dec. 17th and specially during Oct. a total of 23 including 5 together at Holkham. Majority probably of Scandinavian origin.

Lesser Spotted Woodpecker: Recorded at 37 localities.

Wryneck: *Spring:* In May one at Wootton Marshes on 3rd with singles at Blakeney, Holkham, Ridlington Common, Shadwell (Breck), Wells and Weybourne between 6th and 8th.

Autumn: N/E coasts: Recorded on many dates between Aug. 1st and Oct. 17th with majority between mid-Aug. and third week of Sept. Noted at Burnham Market, Beeston Regis, Brancaster Common, Blakeney Point, Cromer, Cley, Hickling, Holme, Hunstanton, Holkham, Ludham, Mundesley, North Walsham, Sheringham, Salthouse, Thornham, Waxham, Wells, West Runton and Winterton Dunes. Difficult to estimate numbers as some made lengthy stays (one ringed at Holme Sept. 25th stayed until Oct. 15th), but minimum autumn total of 81 birds.

Wash: Snettisham Sept. 10th.

Central: Norwich (Eaton Rise) Sept. 18th.

Woodlark: Breck: Present in breeding season at 8 localities.

Shore Lark: North coast (Holme to Weybourne), monthly maxima: Jan. 72, Feb. 96, March 2, Oct. 119, Nov. 228 and Dec. 220. Largest groups at Weybourne (35 in Oct.), Scolt (70 in Nov.) and Cley (110 in Nov.).

Wash: Heacham–Snettisham up to 9 Oct. 28th to mid-Dec.

East: Yarmouth, Breydon, Winterton, Waxham and Trimingham 1–10 in Jan./Feb. and from Oct. 3rd. Extreme dates April 12th (Holme) and Sept. 28th (Cley).

Swallow: Late birds at Carrow (Norwich) Nov. 3rd, at Docking till 7th, at West Runton on 14th and at Drayton Dec. 6th. One wintering in pig sheds at Upwell was unfortunately killed by a cat Dec. 16th.

House Martin: Concentrations of nests at Wells (42 nests on quayside locum), West Rudham (76 nests on bungalow) and Gunthorpe (52 nests on disused house). Young in nest at Castle Acre Priory still being fed Oct. 17th.

November birds at Snettisham on 13th and at Upper Sheringham and Blickling on 15th.

Sand Martin: October birds at Trimingham (4th), Holkham (8th) and Snettisham (24th).

Golden Oriole: Breck borders: At the locality first described in 1970 Report pair returned May 18th; a second male present June 25th and young found July 23rd.

Passage migrants at Foxley Lodge May 22nd, Blakeney on 27th and Salthouse Heath on 31st, Titchwell June 5th and Wells July 20th.

Raven: North: Weybourne 2 west Nov. 5th (DFM). First county record since 1953.

Hooded Crow: October passage on larger scale than for many years. During the month total of 100 passed through Snettisham, with counts of up to 27 at Holme and 15 at Hunstanton in a day. At Horsey 31 assembling to roost Dec. 10th. In Brecks at Holme Hale, Little Cressingham (10) and Ickburgh (24 at a duck farm).

Jay: Helhoughton, two Keeper's gibbets containing a total of 29 freshly killed birds in mid-July gives an indication of distribution.

Dipper: North: River Stiffkey one of north European black-bellied race Oct. 18th (KS). East: Yarmouth Haven Bridge one of British/Central European race Dec. 10th (PRA).

Bearded Tit: Broads: Breeding records from Hickling, Whiteslea, Heigham Sounds, Horsey, Starchgrass, Martham and Catfield Fen.

North: Bred at Titchwell (12 young together early July) and Cley (c. 12 pairs). Interesting Oct. movements: Wells Abraham's Bosom 13 circled higher and higher before departing west at a great height Oct. 7th; Holme up to 30 during first half Oct. and Brancaster 48 south-west Oct. 3rd and 30 south-west on 6th.

East: Autumn/winter records: Burgh Castle 8 travelling high westwards Sept. 30th; Hardley Flood 25; Cantley B.F. up to 100 (57 ringed); Waveney valley at Belton 40; Haddiscoe Island 17 caught (4 carrying Suffolk rings) Jan. 8th and Winterton 13 north high over dunes Sept. 23rd.

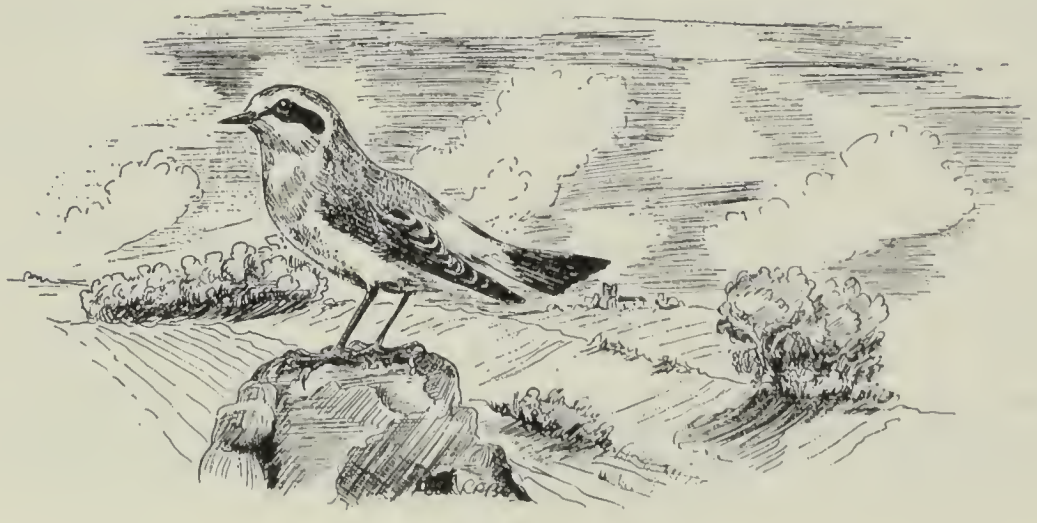
Breck: Stanford Water pair Dec. 3rd (both carrying rings).

Wash: Snettisham 14 mid-Oct. and 10 Dec. 24th.

Fens: Near King's Lynn total of 90 (60 caught and ringed including one Dutch and some British banded birds) Dec. 24th. Wissington B.F. 6 Dec. 26th.

Fieldfare: Late spring birds at Holkham on 14th, Tunstead on 15th, Cranworth on 19th, Wickhampton on 25th and Blakeney on 28th. Apart from one over Walsey Hills Cley July 16th next observation Aug. 29th when one at Blakeney Point followed by others at Weybourne and Holkham on 3rd, Blakeney Point and Holme on 13th, Hunstanton on 15th and Foxley on 16th.

Redwing: First autumn birds at Cley (3) Aug. 31st and at Wells Sept. 4th.



Ring Ouzel: Coastal records between March 31st (Snettisham) and Oct. 19th (Hickling and Holme) and 31st (Beeston Regis). No party exceeded 6 apart from group of 12 at Cley.

Wheatear: Extreme dates March 17th (Weeting) and Nov. 8th (Snettisham) and Heacham (Nov. 11th).

Stonechat: *Breeding:* North: Weybourne a pair raised 3 broods.

East: Winterton–Horsey 3 pairs.

A bird showing the characteristics of the Siberian race *maura* at Cley in May and Dec.

Whinchat: Breck: 7 pairs bred in Sturston-Stanford area. Late birds at Hunstanton G.C. Oct. 28th/29th.

Black Redstart: *Breeding:* Yarmouth 3 pairs bred successfully and 3 additional singing males located (PRA *et al*). Norwich (Duke Street area) pair from May 15th, male observed carrying nesting material and in song till July 5th. Hellesdon Mill a pair unsuccessful.

Migrants: Total of 43 spring/autumn birds between March 21st and Nov. 23rd including inland records at Mulbarton and R.A.F. Swanton Morley. A male remained at Brancaster golf clubhouse from Nov. 6th until Dec. 23rd.

Bluethroat: North: Cley May 7th and Warham on 10th. Cley Aug. 27th to Sept. 3rd.

Aquatic Warbler: East: Waxham Aug. 26th (RJG).

North: Cley Aug. 29th (RM,MPT) and Sept 1st and 15th (FAW).

Icterine Warbler: North: Total of 12 at Blakeney Point, Cley, Holkham, Holme, Sidestrand and Wells between Aug. 13th and Oct. 4th.

East: Yarmouth Oct. 15th.

Blackcap: January records from North Pickenham, Holt and Thorpe St. Andrew. November from Wiveton and Winterton (4th), Holme (16th) Caistor St. Edmunds (20th) and Wells (26th). Dec. from Holme (28th).

Barred Warbler: North: Total of 15 at Blakeney, Blakeney Point, Cley, Holme, Hunstanton G.C., Quarles, Sheringham and Wells–Holkham between Aug. 14th and Oct. 1st.

East: Waxham Sept. 19th and Winterton on 20th.

An immature caught and ringed at Sheringham was re-trapped there 3 days later; and indication of the leisurely speed of autumn migrants. Another, which remained at Hunstanton 6 days fed on the same bryony clump as 1971 bird.

Greenish Warbler: North: An unprecedented concentration of 5 in just 8 days: Blakeney Point Aug. 27th/28th (SCJ, PFT, DIMW *et al*;) a different bird Sept. 1st–3rd (SJB, SCJ, RT *et al*), Wells Sept. 1st–3rd (SCJ, CJM-G, HPM); a different bird Sept. 2nd (SCJ); Holkham West Wood on 3rd (DIMW).

Chiffchaff: Arrival from March 22nd at Surlingham and Ormesby. Wintering birds during Dec. at Hardley Flood (5th), North Elmham, Cley (17th) and Bawsey till year end (ringed on 26th).

Wood Warbler: Spring arrival from May 7th and breeding season records from 11 localities.

Passage migrants at Winterton, Holkham and Wells between Aug. 25th and Sept. 27th.

Yellow-browed Warbler: North: Holme, Sept. 27th/28th. Wells/Holkham 1–2 between Sept. 27th and Oct. 23rd. East: Winterton Sept. 27th. Simultaneous arrival followed several days N.E. wind.

Pallas's Warbler: North: Holme Oct. 17th to 19th (HBO). Caught and ringed.

Firecrest: *Spring:* Holme April 10th (ringed), Wells on 11th and Brinton May 1st.

Autumn: Total of 26 at Blakeney Point, Cley, Happisburgh, Holkham/Wells, Holme, Paston, Stiffkey, Trimingham, Waxham, Winterton and Yarmouth between Aug. 31st and Oct. 28th.

Further reading: "The colonisation of England by the Firecrest" (*British Birds*, 66 pp. 159–166).

Spotted Flycatcher: Very late bird at Old Catton Nov. 4th (GPH).

Pied Flycatcher: Customary very small spring passage including one inland at Mousehold Heath May 10th. Late autumn birds lingered at Yarmouth till Oct. 14th and at Wells till 17th.

Red-breasted Flycatcher: A single spring occurrence: Brancaster May 7th (RK). Autumn total of 17 at Wells-Holkham, Holme, Blakeney Point, Blakeney, Cley and Yarmouth between Aug. 30th and Oct. 23rd.

Richard's Pipit: Autumn total of 8 at Cley, Holme, Sheringham and Wells between Sept. 6th and Oct. 21st.

Tawny Pipit: North: Cley May 7th (MPT).

Water Pipit: Most favoured locality is Cantley B.F. which attracted up to 7 between early Jan. and March 21st. March and Dec. occurrences at Breydon; in autumn ones and twos at Cley, Weybourne, Sheringham and Winterton from Sept. 13th.

Grey Wagtail: Nested at 4 sites. Passage/wintering birds at 39 localities.

Blue-headed Wagtail: (*M.f. flava*): Spring birds at Ormesby, Salthouse, Weybourne and Cley from April 22nd.

Waxwing: Between Jan. 1st and Feb. 23rd total of 22 at Blakeney, East Rudham, Hales, Loddon, Mulbarton and Wroxham.

During Nov. (8th to 25th) total of 89–99 at following localities. No party exceeded 8 apart from 30–40 at Heacham: Acle, Cley, Felmingham, Foulsham, Gaywood, Gorleston, Heacham, Holme, Hunstanton, King's Lynn, Mulbarton Snettisham, Taverham, Wells and Wroxham.

Great Grey Shrike: Singles recorded at the following localities up to May 2nd and from Sept. 30th; also late birds in May at Kelling (14th), Brancaster (29th) and Weybourne (19th till June 13th):

Acle	Holt	Snettisham
Beeston Regis	How Hill	Sparham
Beetley	Hunstanton	Stiffkey
Binham	Kelling	Thetford
Brancaster	Langham	Thornham
Buxton	Little Snoring	Threxton
Chedgrave Common	Morston	Wells
Cley	Mousehold Heath	West Acre
Dereham	Muckleborough Hill	West Newton
Didlington	Narborough	Weybourne
Grimston	Roydon Common	Whitlingham
Guestwick	Salthouse Heath	Winterton
Hardley	Santon Downham	Wiveton
Hickling	Sheringham	Yarmouth
Holme	Stanford Water	

Woodchat Shrike: Additional 1971 record: North: Holkham Sept. 18th (BB, RC, JF).

Red-backed Shrike: *Breeding season distribution:* North 6 pairs at 5 sites. East: 3 pairs at one site. Breck: 9 pairs at 7 sites. County total 18 pairs.

Migrants: Singles at Hunstanton Sept. 10th and at Beeston Regis Oct. 4th (late).

Hawfinch: 1971/2 locality summary:

Arminghall
Blakeney
Brooke
Caistor St. Edmunds
Cley
Cranwich
Dereham
Didlington
Earsham
East Wretham
Felbrigg
Foulden
Foxley
Hargham
Holkham
Horning
Horsey
Kirby Bedon
Letton Park
Methwold
Norwich
Thompson
Shadwell
Saint Helen's Well
South Raynham
Stanford
Swaffham
Walsey Hills
Watton
Wells
West Runton

In 1971 largest parties at East Wretham totalled 23 and a pair bred; only other breeding report came from Hargham where colony of 5 pairs. In 1972 largest group at Cranwich (30 in Jan. and 20 in Dec.) feeding in yews.

Goldfinch: Thorpe St. Andrew: A roost in evergreen oaks and hollies first occupied Dec. 25th reached a peak of 500 by mid-Jan. 1973; still 250 present Feb. 18th 1973 (GEW). According to *Finches* (1972) roosting in this country is usually of 10–20 birds but up to several hundreds on continent.

Siskin: Garden bird tables visited at Caister on Sea, Cromer, Dereham, Elmham, Norwich and Sprowston.

Redpoll: An exceptional irruption of Mealy Redpolls took place from Oct. 7th onwards and a total of 96 ringed at Wiveton between Oct. 14th and Dec. 19th (MPT). At Winterton Oct. 13th/14th 50% of redpolls present considered Mealy. Small parties recorded at Sandringham and Holme.

Arctic Redpoll: North: Wiveton singles trapped Oct. 24th, Nov. 14th and Dec. 19th (MPT). Sight records at Holme Sept. 27th/28th, Holkham (2), Oct. 13th–15th and Wells (2) on 18th.

East: Winterton Oct. 29th.

Crossbill: In Brecks widely distributed in small numbers. August coastal records at Dersingham (1st) and Sheringham (19th), but majority of records in second half of Oct. including up to 14 together at Wells, male in sugar beet at Waxham on 8th, singles on 6 dates at Holme and 6 at Ludham 17th–18th.

Brambling: Peak numbers present Nov.–Dec. including 300 at Sandringham, 300 at County Hall Norwich and 1500 feeding on seed kale at Sharrington.

Ortolan Bunting: East: Waxham ringed Sept. 18th (DF). North: Holme Aug. 31st (HBO).

Rustic Bunting: North: Wells immature male Oct. 17th to 22nd (SCJ *et al*). Second county record.
Lapland Bunting: North coast: Up to 30 together at usual haunts from Sept. 20th onwards. East: Paston 1–8 Oct. 7th to Nov. 21st; Winterton Oct. 13th and Breydon/Halvergate peak of 17 Dec. 24th.
Snow Bunting: Wash/North/East coasts: Extreme dates April 3rd and Sept. 6th. Winter maxima include Breydon/Lower Bure 60, Cley/Salthouse 220, Scolt 30, Holme 40 and Snettisham 117.

The following, not mentioned in the Classified Notes, were also recorded in 1972 (*breeding species in italics*): Black-throated Diver, Great Northern Diver, Red-throated Diver, *Little Grebe*, Gannet, *Mallard*, *Teal*, Wigeon, Scaup, Ruddy Shelduck, *Canada Goose*, *Mute Swan*, Merlin, *Kestrel*, *Red-legged Partridge*, *Partridge*, *Pheasant*, *Water Rail*, *Moorhen*, *Coot*, *Lapwing*, Grey Plover, *Snipe*, Jack Snipe, *Woodcock*, *Curlew*, Whimbrel, Bar-tailed Godwit, *Redshank*, Knot, Dunlin, Sanderling, Great Black-backed Gull, Lesser Black-backed Gull, Razorbill, Guillemot, *Stock Dove*, *Wood Pigeon*, *Cuckoo*, *Tawny Owl*, *Green Woodpecker*, *Skylark*, *Carrion Crow*, *Rook*, *Jackdaw*, *Magpie*, *Great Tit*, *Blue Tit*, *Coal Tit*, *Marsh Tit*, *Willow Tit*, *Long-tailed Tit*, *Nuthatch*, *Treecreeper*, *Wren*, *Mistle Thrush*, *Song Thrush*, *Blackbird*, *Redstart*, *Nightingale*, *Robin*, *Grasshopper Warbler*, *Reed Warbler*, *Sedge Warbler*, *Garden Warbler*, *Whitethroat*, *Lesser Whitethroat*, *Willow Warbler*, *Goldcrest*, *Dunnock*, *Meadow Pipit*, *Tree Pipit*, Rock Pipit, *Pied Wagtail*, White Wagtail, *Yellow Wagtail*, *Starling*, *Greenfinch*, *Linnet*, Twite, *Bullfinch*, *Chaffinch*, *Corn Bunting*, *Yellowhammer*, *Reed Bunting*, *House Sparrow* and *Tree Sparrow*.

Above: **Pied Flycatchers are often abundant along the Norfolk coast in autumn following drift migration from the Continent. Late birds continue passing through during October – latest being on 30th (1959) with a straggler on November 17th (1957). Spring passage is on a small scale; April 16th (1961) being the earliest.**

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Below Left: **Red-breasted Flycatchers appeared in 1972 at Yarmouth, Cley, Blakeney Point, Wells, Holkham, Brancaster and Holme. The European breeding range is very similar to that of the Barred Warbler and expanding slowly westwards. Nesting was first proved in the Netherlands in 1967. In autumn the species migrates east through Iran and Afghanistan to winter mainly in western India. Reverse migration, especially of juveniles under the influence of central European anticyclones, is held to explain occurrences in western Europe in autumn.**

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Below Right: **A north European Black-bellied Dipper was discovered along the river Stiffkey in October. More unusual was a bird of the British/central European race on a pier of Yarmouth Haven Bridge in December.**

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Copyright *Dr. K. J. V. Carlson*

The Sparrowhawk has become one of the rarest breeding birds in Norfolk. It nests late when fledgling song birds are plentiful. The hen regularly takes prey more than twice her weight, such as Woodpigeons.

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Dr. K. J. V. Carlson

Short-eared Owls nested in 1972 at Wickhampton, Halvergate, Holme and Blakeney fresh-marshes. Remarkable numbers were attracted to Halvergate marshes during December. A peak of 116 birds was recorded on 24th including 80 in the air together. During an irruption in the 1964/5 winter up to 80 Short-eared Owls assembled at Halvergate roosting in a ruined cottage and in an abandoned orchard.

Copyright *E. E. Jackson*

The derelict marsh drainage mills still standing on Halvergate Level provided observation points for watching White-fronted Geese once there in their hundreds. Today, these winter visitors from the Siberian tundra are almost a memory.

HALVERGATE WITHOUT WILDFOWL

R. H. Harrison

Stretching westwards from the north bank of Breydon Water lies a vast area of marshland constituting in many ways some of the loneliest land in the whole of Norfolk. These "fresh marshes" are divided into groups, or "levels". The largest is Halvergate Level bordering either side of the Halvergate Fleet which is the main drainage dyke.

My association with this area goes back to the late 1920's and I made many wildfowling trips when thousands of acres were flooded. Five drainage mills were spaced out along the length of Halvergate Fleet. They could cope with average rainfall, but during calm spells – when the mills were idle – the water would soon build up in the network of smaller dykes before overflowing on to the marshes. To prevent severe flooding along the Fleet there were two protective banks, one known as the "Summer Wall" and 15 to 20 yards further back was the higher "Winter Wall". The land between these banks was referred to as "rond" and this would flood along the complete length of the Fleet each winter. This miniature Ouse Washes was a paradise for wildfowl, particularly for great companies of Wigeon and for thousands of White-fronted and Pink-footed Geese then regularly wintering here.

The Pink-feet were frequently seen on Halvergate marshes, but these were always more attractive to the White-fronts. The Pink-feet normally favoured the marshes adjoining the lower Bure. However, it was not unusual to find both species feeding together. In some winters both species of geese were present in about equal numbers, but over a period of some 40 years, the White-fronts usually outnumbered the Pink-feet. Maximum numbers were reached between 1938 and 1946, in spite of the war-time network of tubular steel barriers erected on the marshes to prevent an airborne invasion. These barriers had no adverse effect on the geese and I learned of no bird coming to grief by striking them.

Peak numbers of wintering White-fronts were attained in the 1938/9 winter: on 5th December 1938 some 3,000 passed over Breydon heading for Halvergate. War-time restrictions made it impossible to obtain regular winter estimates of numbers between 1939 and 1945, but in 1946 over 5,000 geese were wintering here: 2,000 White-fronts and 3,000 Pink-feet. The following year saw an exceptional weather movement of White-fronts – presumably from North Germany and the Netherlands. One morning towards the end of January 1947 (only a few days before Arctic weather conditions commenced in Britain) skein after skein of White-fronts came into the marshes from Scroby Sands at first light. This arrival occupied almost an hour, the geese appearing to completely cover two marshes. A conservative estimate was of between 3,500 and 4,000 birds.

A more recent abnormal passage movement was recorded on 25th January 1964 when a total of over 4,000 White-fronts headed westward across Halvergate Level. That winter the peak number of local birds was only 320 (*Norfolk Bird Report* 1964, p. 198). Annual counts since the 1945/6 winter are given in *Birds of Norfolk* (1967).

The first autumn arrivals of White-fronts were expected in the second week of October (3 early birds were shot at Breydon 30th September 1939), but the main flocks seldom arrived before December. In the 1949/50 winter which was very

mild none put in an appearance until 21st January. By the second week in March all would have departed unless the winter had been exceptionally severe. In 1956, for example, some lingered until 16th March and in 1963 until the 23rd.

Record numbers of Pink-feet were obtained in 1943 and in 1946; on both occasions 3,000 were estimated. In 1943, the peak total was recorded on 26th December when the birds were feeding on Mautby/Runham marshes. The first autumn Pink-feet arrived during the latter part of September; earliest date being 25th September 1955. First arrivals seldom stayed any length of time and there was then a gap until late October when the main flights arrived (in 1936, for example, 1,000 Pink-feet reached the lower Bure marshes on 30th October).

After feeding on the lonely levels both the Pink-feet and White-fronts flighted to Scroby Sands to roost. During spells of fog and storms, however, the birds avoided heading out to sea and in these conditions they resorted to Breydon estuary. Normally diurnal feeders, at times of full moon the Pink-feet in particular favoured feeding at night.

Halvergate was always the most important level for White-fronts, but the flocks frequently divided and for days or even weeks skeins of these long distance travellers from Northern Russia frequented the extensive levels at Wickhampton, St. Benet's Abbey, Norton, Thurlton, Buckenham, Claxton, Langley and Haddiscoe Island.

After 1947 Halvergate began declining as a wildfowl resort. The introduction of electric pumping stations resulted in the old drainage windmills falling into decay. Each succeeding winter saw less and less flooding. The Wigeon were the first to feel the effects of this modern drainage and their numbers quickly declined; today they have vanished from Halvergate. The departure of the geese was more gradual. From 1947 to 1957 the numbers fluctuated between a few hundred and 1,500 birds, according to the severity of the winter. Pink-feet were the first to forsake the area, but White-fronts continued arriving, although in declining numbers. The 1972/3 winter brought the smallest number on record since 1928 and less than 50 were present.

Two full decades of modern drainage have completely changed the character of these marshes and with fewer cattle, hundreds of acres have been reclaimed and put to arable purposes, chiefly for wheat. Despite these great changes, there still remain many acres in the more remote parts of the great level which have scarcely altered since they were first drained for grazing. These still attract a variety of birds.

During the winter Halvergate is much favoured by Short-eared Owls. Numbers vary according to the quantity of Voles, but it would be an exceptional winter if one could not see at least half a dozen of these "marsh owls". 1964/5 was an outstanding winter when as many as 100 were present. Many of these Short-eared Owls occupied a derelict marshman's house and its wild garden as a day-time roost. One or two pairs of Short-eared Owls usually breed on these marshes; the first nest was recorded in 1936.

It has been interesting to note the changing status of marshland birds: Lapwing and Redshank are still present in large winter flocks, but both have sadly declined as breeders. Golden Plover were present in great numbers each winter until the 1940's. Then they left. Within the last five or six years, however, they have again become abundant and flocks of up to 300 have become a feature of the reclaimed marshes sown with winter wheat.

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G. Hooton
J. Howard
H. Hunt
P. Jarman
B. W. Jarvis
M. J. Jenner
G. Jessup
C. Johnson
C. J. Johnson
S. C. Joyner
G. I. Kelly
I. Keymer
Dr. B. King
J. Kinsley
R. Kimber
P. D. Kirby
C. A. E. Kirtland
C. J. Lacey
J. M. Last
A. J. Lawrie
Miss V. Leather
S. E. Linsell
R. H. Loyn
R. Ludford
C. J. Mackenzie-Grieve
J. Magee
J. Makepeace
Mrs. D. M. Mansell
R. C. Mansfield
Capt. P. B. Marriott
J. Marsham
K. Martin Jones
R. P. Martins
Miss A. H. May
D. S. A. McDougall
Miss E. McEwen
R. McIntyre
H. P. Medhurst
D. Moore
D. R. Moore
N. H. Moore
D. F. Musson
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Nature Conservancy
Norfolk Ornithologists Assn.
Norfolk Young Naturalists
P. J. Oliver
D. L. Ovenden
D. Pawsey
F. H. Pigg
J. Pound
C. D. Raby
J. Raincock
H. R. Ramsay
J. Reynolds
D. I. Richmond
G. F. Rivers
C. Robinson
Mrs. J. H. Rounce
C. Rose
Royal Society for Protection of Birds
J. E. Sandford
Col. R. W. Sankey
D. J. W. Sayer
R. Scott
M. J. Seago
C. Self
K. W. Self
Dr. J. T. R. Sharrock
A. P. Simes
R. Skelton
E. G. Skoyles
D. Smith
M. R. Spurgeon
A. J. Stagg
M. Steward
A. Stones
B. J. Summers
N. D. Summers
Dr. M. P. Taylor
R. Thompson
P. Trett
L. C. Tromans
P. F. Twist
Mrs. B. M. E. Unsworth
D. B. Upton
A. E. Vine
Dr. D. Walker
D. I. M. Wallace
F. A. Ward
F. A. Wardman
B. Watts
R. Wells
J. P. Widgery
M. J. Wigginton
Wildfowl Trust
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G. E. Wright
Miss I. Wymer

Norfolk Mammal Report 1972

Editorial

We are pleased to present to members the 19th annual report on Norfolk Mammals.

In order to observe mammals a great deal of skill and patience is required, as unlike birds the subject are seldom so conspicuous. In consequence there appear to be fewer mammal watching enthusiasts, a great pity in view of the potential for discovering something original about distribution, behaviour or habitat requirements; all within the scope of any observer. Having said this, it is encouraging to report an increase in the number of observers and records received for 1972.

Morris Gosling has kindly written an article on the Coypu in East Anglia which illustrates the amount of work being carried out on this animal and also revives the Naturalist's Society custom of recording lectures given at meetings for future reference. Like Coypu which were originally imported for fur-farming and subsequently became naturalised, so other non-indigenous mammals could do the same. During August a Civet escaped at Claxton, as have several Chipmunks, while a number of Souslik were rumoured to be at large. Given favourable conditions these animals could theoretically breed and start feral colonies, so perhaps such records are worthy of note for historical reference.

Small mammals and bats will require much more attention in the near future if we are to improve the distribution maps for over a dozen species. For the larger mammals it is apparent that Norfolk has a low population of both Badger and Otter. The former need the sympathy of owners of woodland and otters would benefit from land owners in the river valleys offering protection along their rivers.

On page 67 is a report received from the Master of the Eastern Counties Otterhounds. We would like to emphasise that the views expressed are not necessarily those of the Editor, the Norfolk Naturalist's Trust or the Norfolk & Norwich Naturalist's Society.

The mammalian road casualty figures for the stretch of A47 between Yarmouth and the "Stracey Arms" for 1972 were as follows: 123 Brown Rat, 41 Rabbit, 32 Hare, 5 Hedgehog, 3 Stoat, 2 Coypu, 1 Weasel and 1 Ferret.

Finally, our grateful thanks are extended to John Last for the vignettes and to Dennis Avon, Tony Tilford and Paul Richards for the photographs: to the Ministry of Agriculture, Fisheries and Food and Seals Research Unit for all their help: to Annette Chatten, Judy Murray and Norma Watt for typing the report and to all the contributors, without whom this report would not be possible.

Please send your 1973 Mammal notes **by the end of February 1974** to John Goldsmith, Castle Museum, Norwich, NOR 65B.

THE COYPU IN EAST ANGLIA

by L. M. Gosling, *Coypu Research Laboratory, Ministry of Agriculture, Fisheries and Food*

COYPUS (*Myocastor coypus* Molina) are semi-aquatic hystricomorph rodents indigenous to South America. Adult males in England may exceed 7 kg. in weight although few reach this size because of intense trapping. Heavily pregnant females weigh up to 10 kg. but without embryos they usually weigh about a kilo lighter than males. In South America the species ranges from Uruguay in the East, to Bolivia in the North-West and down to Southern Chile through Argentina in the West. Several sub-species have been described but the species is in need of taxonomic revision and the various forms might be better regarded as races. The form now feral in East Anglia most closely resembles *M.c. bonariensis* mixed stock; there has been extensive selective breeding of captive coypus as described by Kinsel (1958) in his entertaining book on coypu husbandry.

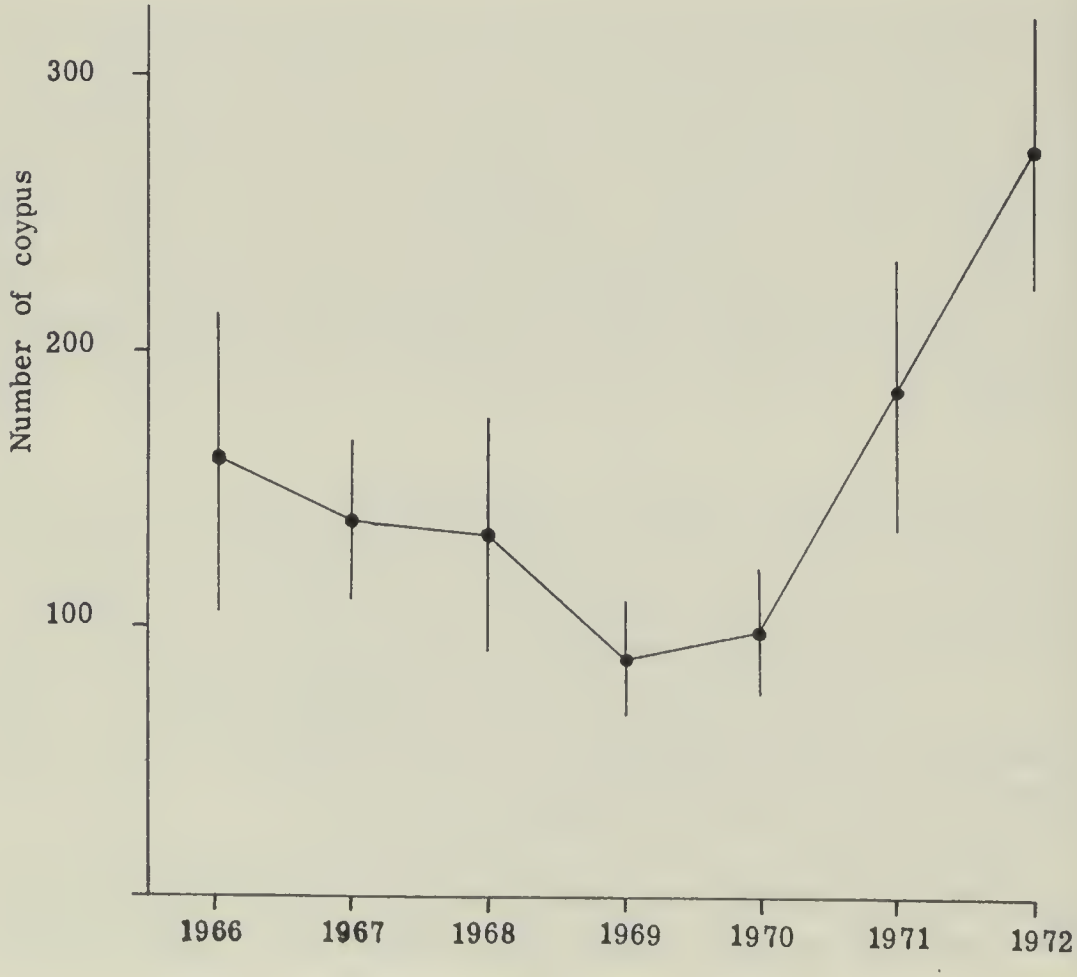
The dense underfur of coypus has been widely used commercially and was particularly valuable as a fashion fur in the 1920's. Fur farming started in Argentina at this time and shortly afterwards breeding stock was exported to various parts of the world. As a result of escapes and in some countries deliberate releases, feral coypus are now present in North America, England, Europe, Russia, the Middle East and Africa. Their success can perhaps be attributed to the considerable similarities of aquatic and semi-aquatic plant communities throughout this range. Ironically while coypus flourish in novel habitats, throughout much of their native range in South America they are in danger of extinction, largely because of poaching (Barlow 1969).

The first coypu fur farms in England were established in about 1929. Eventually there were about fifty, most of which were in the southern and south-eastern counties where plentiful natural water supplies were available (Laurie,

1946). After a brief heyday the farms were all discontinued at the start of the war in 1939. Some animals were probably released at this time but in any case numerous escapes had already occurred and by the early 1940's there were small feral populations in Norfolk and Buckinghamshire. The colony in Buckinghamshire persisted up to about 1954 (Norris, 1967) and then disappeared. In spite of trapping organised by the War Agricultural Executive Committee in 1943 and 1944 wild populations persisted in Norfolk and soon expanded into Suffolk. Numbers probably increased slowly at first but coypus were commonly seen up to 1946. The population then received a set-back in the severe winter of 1946/47. Again there was a slow increase at first but by the mid-fifties it was obvious that there was a considerable and expanding population. Damage to dyke banks and river walls (Cotton, 1963) to agricultural crops and to our indigenous flora led to the realisation that coypus represented a threat both in economic terms and through disruption of the existing balance within marshland

FIG. 1. AVERAGE MONTHLY COYPU CATCH, FROM 1966 - 1972.

The vertical bars (2 standard deviations) are measures of variation in the monthly catch each year.



plant communities. Following representations by farmers, drainage boards, river authorities and naturalists the coypu was recognised as a pest and in 1962 was added to the list of species included in the Destructive Imported Animals Act. By this time coypus numbered about 200,000 (Norris, 1967) and were rapidly expanding their range (Davis, 1963). Government support was given to organisations that were attempting to control coypus and finally the Ministry of Agriculture, Fisheries and Food organised a campaign with the objectives of drastically reducing numbers and confining the survivors to the Norfolk Broads and other marshland areas where it was thought that coypus would be impossible to exterminate completely. The campaign ran from 1962 to late 1965 and succeeded in its aims. A complicating effect, however, was the heavy mortality caused by the severe winter of 1962/63 which killed 80 to 90% of the population (Norris, 1967). The campaign trapping undoubtedly had its major effect in reducing the hardy individuals that survived the winter. At the end of the campaign the control of coypus became the responsibility of a consortium which was supported by contributions from Drainage Boards, the River Authority and a 50% Government grant. With administrative changes the consortium, now known as "Coypu Control", has continued operations up to the present. In the field it consists of an experienced team of trappers which varied between five and seven men up to the end of 1972. In 1973 the number of trappers has been increased in response to the recent population increase which will be discussed in this paper.

For the first four years after the campaign the size of the population, as indicated by the numbers killed in control operations, showed a progressive decline (Fig. 1). In 1970, however, about the same number were caught as in the preceding year and by 1971 it was clear that the population was in the early stages of a period of rapid growth. This was confirmed by the large kill of 1972. At the time of writing, in July 1973, there have already been more coypus killed than in 1972 although this is partly due to an increase in the number of trappers.

In spite of the increase in population size there has not yet been a significant expansion in range (Fig. 2). It should be emphasised that the population which is present in 1973 is still very small compared to that of the early 1960's. Presumably range expansion would occur if numbers were allowed to reach the levels of the late fifties; at that time coypus were spreading outwards into surrounding counties, probably in response to high population density in Norfolk and Suffolk.

The post-campaign population is the subject of a current investigation at the Coypu Research Laboratory in Norwich. The project is planned as an integrated study of its ecology, social organisation and dynamics; a major aim of the work is to explain the fluctuations in numbers which have occurred over the past eight years and to predict future trends.

Trapping is undoubtedly the major source of mortality for adult Coypus and there is little doubt that it was the principal cause of the population decline in the late '60's. In recent years it is clear that there have been changes which resulted in recruitment exceeding deaths from trapping. In the present paper I will briefly describe some preliminary results which have suggested the hypothesis that the population increase from 1970 to 1972 was caused by improved reproductive success and juvenile survivorship and that these factors are closely linked with climatic variation and the resultant variation in food availability.

FIG. 2 (i) COYPU DISTRIBUTION IN EAST ANGLIA 1969

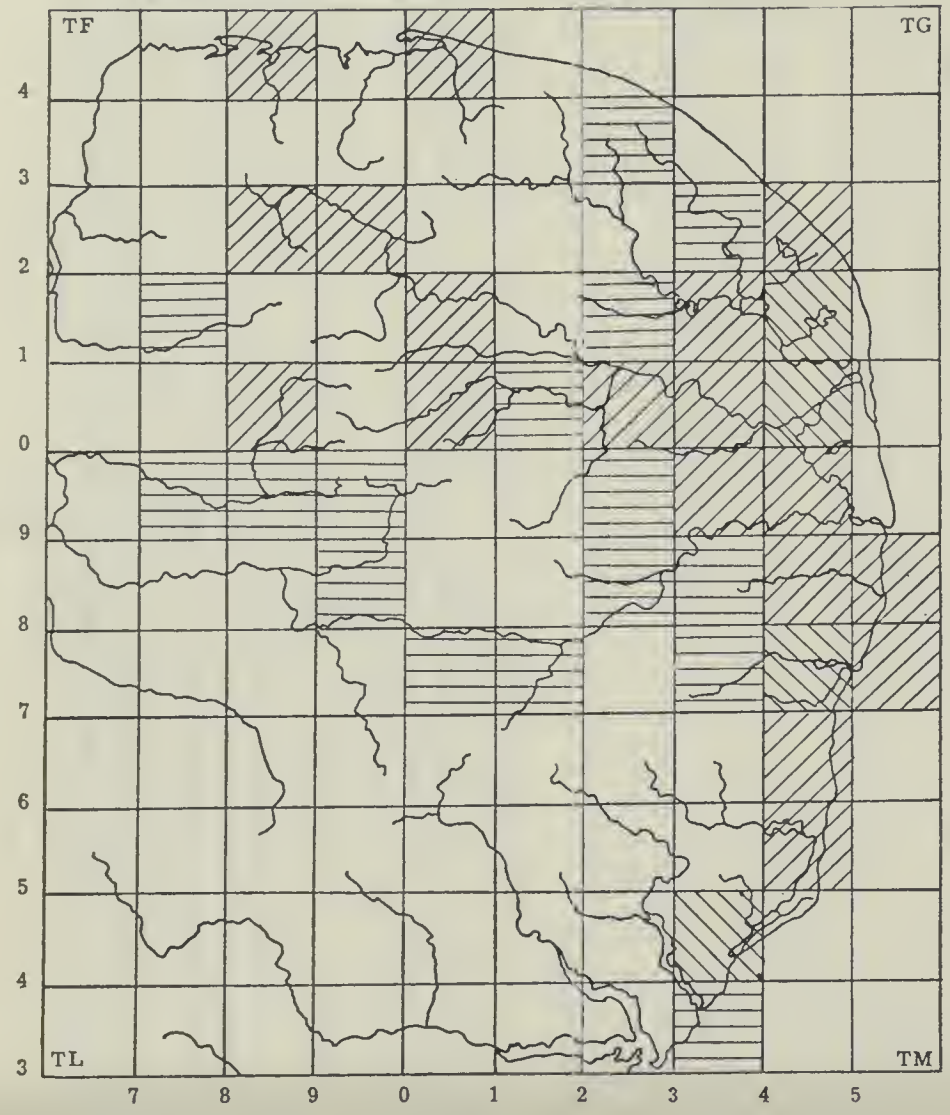
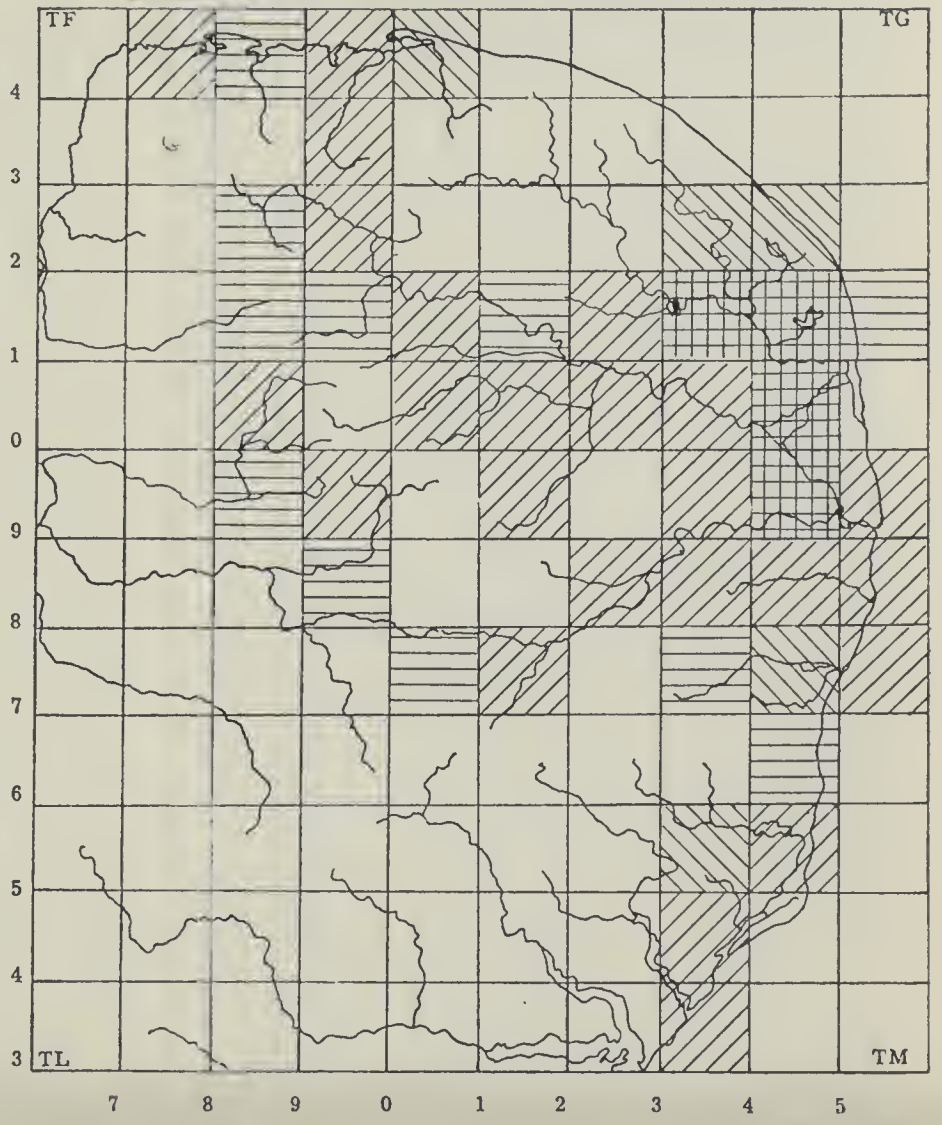


FIG. 2 (ii) COYPU DISTRIBUTION IN EAST ANGLIA 1972



Feeding ecology

Coypus are almost entirely herbivorous although they sometimes eat freshwater mussels. Ellis (1963) has published an account of the plants eaten by coypus in Norfolk but apart from this little information is available on feeding habits. In the present study we are examining feeding in some detail within a 7 ha. enclosure which includes Calthorpe Broad. The enclosure contains a self. perpetuating population of about 20 to 30 coypus. Each month evidence of coypu feeding is recorded during a series of randomised transects. From these data monthly estimates are obtained of the frequency of feeding of different plant species and also of feeding on different parts of each plant. These results are checked from brief monthly inspections of a number of sites in the wild. The results gathered to date have demonstrated a complex but ordered pattern of utilisation throughout the year. Coypus feed selectively from a broad range of plants and also select particular parts, such as the leaf blade or fruit in particular seasons.

A few examples of seasonal feeding are presented in Fig. 3. Fig. 3 (i) shows the frequency of feeding on the basal meristem of the tufted sedge (*Carex elata* All.). Each shoot is bitten off at or just below ground level and the pale succulent base eaten; the remainder of the shoot is discarded. *C. elata* is utilised only in the spring but within a month or two the majority of the young plants are destroyed. In spite of this *C. elata* continues to be very abundant at Calthorpe because the replacement shoots are not utilised after about May and grow to maturity. In the spring coypus appear to feed on a wide range of young sprouting plants. This type of feeding is difficult to detect in the field because the entire plant is often consumed but it should be revealed by microscopic examination of faecal samples and of the stomach content of animals killed during control operations; these analyses are currently in progress.

In the summer there is a change to a more selective feeding pattern. At a study site on grazing marshes near Reedham, coypus concentrate on the bases of the Great Pond Sedge (*Carex riparia* Curt.) and the Burr-reed (*Sparganium erectum* L.). In 1971 these plants were utilised sequentially but in 1972 only *S. erectum* was eaten. It seems that these species are alternative food sources during the summer. Selection might depend on individual preferences or on undetected variation in nutritional content from year to year. The wild coypu population, as opposed to the captive group at Calthorpe suffers heavy mortality from trapping which could result in a more varied pattern of feeding. Rats are known to learn food preferences from their parents and in a situation where parents are often killed before this information is transmitted, the population would presumably feed in a more diverse fashion; the same phenomenon might apply to the coypu.

In the late summer and autumn coypus transfer their attention to mature seeds of various types. An example of the utilisation of the Yellow Water Lily

Key to maps on page 52 (numbers killed)

1 - 10

11 - 100

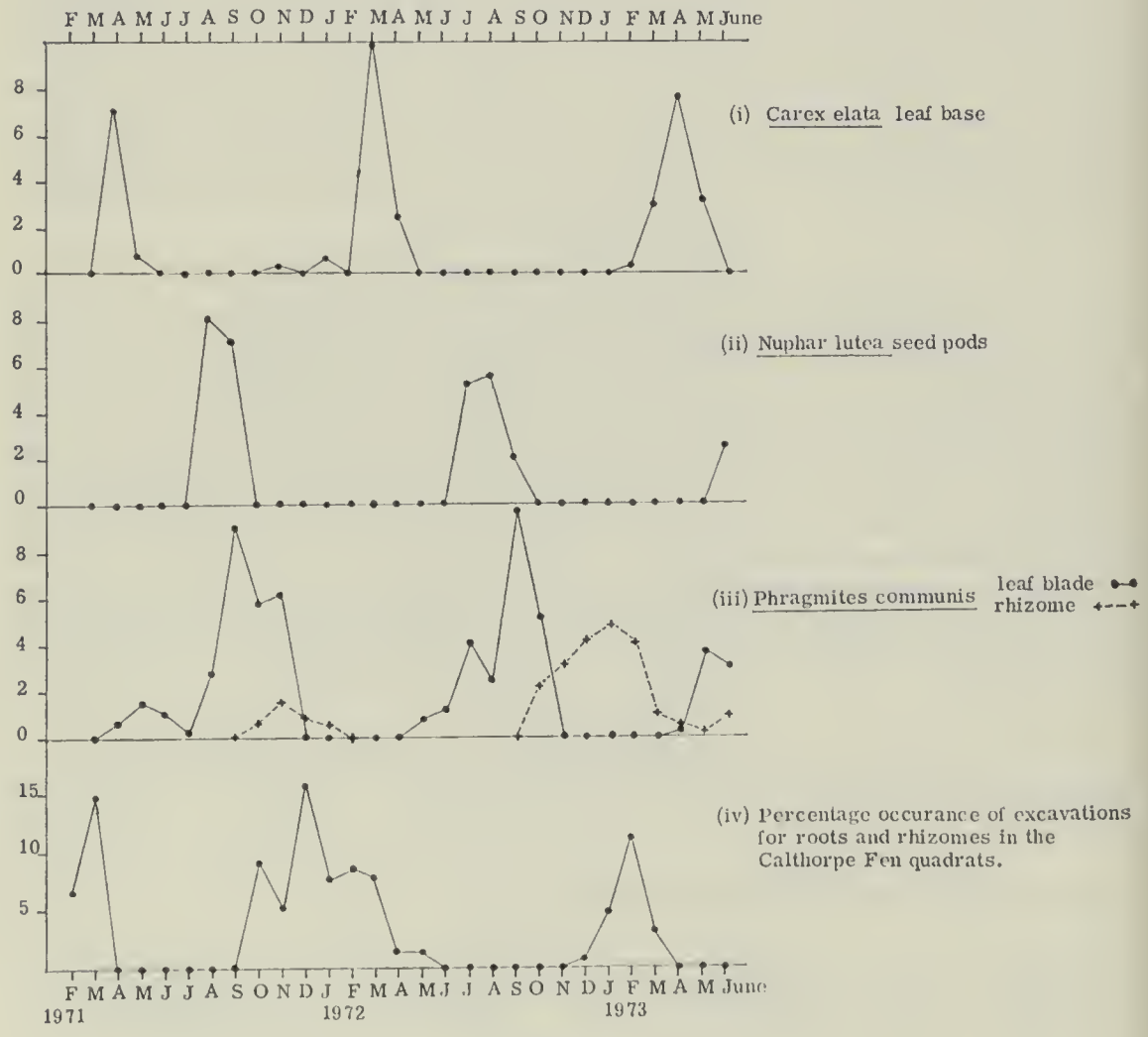
101 - 200

200+

(*Nuphar lutea* L.Sm.) fruits at Calthorpe is shown in Fig. 3 (ii). The well defined pattern of feeding on the lily pods simply reflects availability: coypus start to feed on the pods shortly after they appear and within two months completely remove all those present. In spite of this *N. lutea* continues to flourish in the small broad at Calthorpe probably because coypus do not consume each fruit entirely and because of vegetative propagation. The leaf blades of the reed (*Phragmites communis* Trin.) are also eaten most frequently during the late summer and autumn (Fig. 3 (iii)). This timing might be related to the slow growth of the species but leaves are certainly available from about April onwards so that this pattern cannot be explained simply in terms of availability. In contrast the leaf blades of Reed-grass (*Phalaris arundinacea* L.) are utilised in

FIG. 3. EXAMPLES OF SEASONAL VARIATION IN COYPU FEEDING

In nos. (i) - (iii) the vertical scale indicates the number of quadrats in which feeding is confirmed as a % of the total quadrats examined.



spring and then avoided for the rest of the year. Chemical analysis of these foods are at present being carried out in an attempt to explain these selection patterns.

From the onset of winter onwards coypus excavate the roots and rhizomes of various herbs and these items certainly form the major winter food source. The frequency of excavations in the fen ecotype at Calthorpe are shown in Fig. 3 (iv). The graph of *P. communis* utilisation (Fig. 3 (iii)) also includes a curve showing feeding on the rhizome which chemical analysis has shown to be a rich carbohydrate source in winter. As is the case during all phases of their feeding cycle coypus are highly selective between species. The rhizomes of the Lesser Reedmace (*Typha angustifolia* L.) are clearly preferred at Calthorpe but it has survived, albeit in low numbers, because not all plants are located by coypus in the dense fen habitat and because coypus seldom destroy more than a small part of their extensive rhizome system. In other parts of their range coypus select the rhizomes of the Great Water Dock (*Rumex hydrolapathum* Huds.) and Cowbane (*Circuta virosa* L.). Ellis (1965) has recorded severe reduction in the occurrence of these plants as a direct result of coypu feeding.

A significant aspect of the winter feeding pattern is its variation between winters of different severity. This is partly shown in Fig. 3 (iv) where it is clear that there were fewer excavations in the exceptionally mild winter of 1972/1973 than in the preceding winter (which was also mild, but less so). The reason for this was observably that coypus were utilising the false spring growth, which occurred as early as December in 1972. In other words a spring feeding pattern was superimposed on the normal winter pattern and as a result coypus were considerably fatter in the winter of 1972/1973 than in 1971/1972 (see Fig. 4 and Section 3).

Short grasses appear to be the only items of the coypu diet that are utilised throughout the year although, as might be expected, there is considerable variation in the amount eaten at different times. In the spring there is a dramatic increase in the amount of grazing although pasture is not so extensively grazed as in the winter. Instead coypus intensively graze small areas which are thus maintained as a short and highly productive sward. Grazing intensity remains at high values until July and August when the amount eaten declines. This reduction in utilisation appears to be correlated with the normal mid-year drop in grassland productivity. After August the amount eaten increases again, possibly in response to increased pasture productivity in the late summer. From October grazing declines to the minimum values of January and February when grass has very poor nutritional qualities.

An unfortunate result of the diversity of the coypu feeding strategy is that it allows the utilisation of a wide range of agricultural crops at a number of growth stages. Thus cereals are grazed in the spring and the mature seed heads eaten in the late summer. Various root crops and brassicas are also damaged, particularly in the winter. The most important agricultural damage is to sugar beet which is often eaten in the early summer; small family groups of coypus can devastate several hectares of young beet within a week or two. The aerial shoots are bitten off and discarded and exposed roots gnawed down to ground level. The plant is killed and the loss to agriculture is thus not the weight actually eaten but the weight that the root would have attained by the end of the growing season. Coypus eat about 25% of their body weight each day. If it is assumed that 10%

of the coypu diet consists of agricultural crops and that sugar beet is half of the crop part of the diet, then a population of 200,000 (the number estimated to be present in the early 1960's by Norris, 1967) would eat about 2,000 tonnes per year and destroy about 115,000 tonnes.

Variation in condition

Each month 45 coypus are dissected in order to obtain information about seasonal variation in condition and reproductive performance. Condition is assessed partly from the weights of certain fat pads which are divided by hind foot length to give an index corrected for differences in body size. Considerable variation occurs in these indices but in the case of adult females this is largely attributable to variation in the pregnancy stage: females become progressively fatter after about the sixth week of pregnancy and in the week or two preceding parturition have enormous fat deposits throughout the body. Males on the other hand show variation (Fig. 4) which seems to be more simply correlated with variation in climate and food availability. They are usually thin in January and February and then rapidly lay down fat as spring commences. After high fat values in April and May there is a decline in June. Males become fatter in July and remain in good condition until October when values start to decline to the low January values. Animals that are kept in captivity with a constant food supply remain fat throughout the year.

When female fat index values are plotted against those of males from the preceding month there is a reasonable correlation. Since high fat values in the case of females indicates late pregnancy rather than a particular season it seems possible that females are able to reach late pregnancy at times shortly after those at which males get fat in direct response to an improved food supply. This suggestion is preliminary but it does seem likely that there is a relationship between climate and food availability and the number of females reaching late pregnancy.

FIG. 4. SEASONAL VARIATION IN ADULT MALE CONDITION

FAT INDEX : Inguinal fad pad wt. / Hind foot length. (gms / cm)
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
Mar. A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M June
1970
1971
1972
1973

As can be seen in Fig. 4 there is great variation between years in the male condition cycle. The most consistent variation was the progressively better condition during successive winters. Lowest fat index values were recorded in the winter of 1969/1970 which was of average severity. The mean temperatures of the three winters that followed were progressively higher and males were progressively fatter. This change was probably related to the increase in availability of food during milder winters and to reduction in energy expenditure needed to maintain body temperature. Spring patterns were more erratic but in general they fall into two groups: in the cold springs of 1970 and 1973, when plant growth was delayed, condition improved only slowly. These differences were reflected in the following summers: in 1970 males remained thin for the rest of the year while in 1971 and 1972 they became very fat.

Variation in reproductive success and juvenile survivorship.

Female coypus mature on average at about five months and then breed continuously. There is however considerable variation in the success of pregnancies between different seasons and different years which will be described below. The gestation period is about 132 days and 1 to 13 young are conceived with an average of almost six. Some embryos are resorbed at various stages of pregnancy and the mean litter size at birth is close to five. In addition to partial litter resorption some litters are entirely resorbed and some abort; Newson (1966) has suggested that the proportions of these losses are 28% and 27% respectively. In our current studies we have confirmed that the total litter loss is about 60%. There is, however, variation in the extent of this loss between females of different ages: those over six months of age at conception typically lose 60% of their litters but those under six months old lose about 80%.

Most females conceive again within a few weeks of parturition so that variation in conception frequency is probably not an important determinant of reproductive success under different environmental conditions; the great majority of adult females are pregnant at any time of the year. However, there is variation in the age at which females become mature: in the winter maturity is reached at about seven months of age and in the summer at three months. One might thus expect a higher proportion of breeding females in the summer and thus a higher conception rate in the summer population.

The main factors that influence the number of young born are probably the frequency of resorption, abortion and variation in embryo number. All show seasonal variation: in the winter more resorptions and abortions occur than in the summer. The fact that males are thin at this time suggests that in the winter the population as a whole suffers a nutritional deficit and that increased embryo loss is a response by females to these conditions. This argument is strengthened by a small peak of resorptions in June when males rapidly lose fat. It seems possible that there is some link between the increasing fat levels of females during gestation and the success or failure of the pregnancy. It might be that females resorb or abort when they fail to reach a fat level typical of a particular stage of gestation. If this is the case then it could indicate a reproductive strategy in which females were pregnant for most of the time and in which the pregnancy

was terminated when environmental conditions were poor. Young would thus be produced closer in time to the good conditions that allowed the pregnancy to continue than would be the case if good conditions at conception dictated the timing of parturition. In the English climate, however, large numbers of young are produced in the early winter as a direct result of the good conditions in the autumn and this appears to be a major disadvantage for the population. In general, however, abortion and resorption can be interpreted as mechanisms of a successful reproductive strategy which fails to some degree because of the close proximity of the optimum conditions of autumn and the poor conditions of winter in the English climatic cycle.

The overall loss of litters including loss from abortion and total resorption can be estimated by counting the numbers of litters that survive to successive stages of gestation. Following the precedent of Newson (1966) four week classes are used and the difference between the number in the first and in the last class is an approximation of the total loss for any period. In 1970 the total loss was 64%, in 1971, 57% and in 1972, 38%. This trend conforms with what might be predicted from a hypothesis relating improved food supply with higher reproductive success.

Variation in embryo number also contributes to seasonal and yearly differences in reproductive success. In the period from August 1962 to August 1964, with winters of average severity, mean litter size declined during the winter to a minimum of 5.0 for conceptions in April and then rose to a maximum of 6.8 for those in July (Newson, 1966). This seasonal variation did not occur from 1970 to 1972. Instead litter size remained quite constant with an average of 6.4, that is, at around the summer value of the earlier study.

Juveniles are suckled to about six or seven weeks of age and during this period the massive fat reserves of the females are rapidly depleted. The young start to eat adult food a few days after birth and by two or three weeks are eating quite large amounts. In the summer food is easily obtained and as a result few young die from malnutrition. In the winter, however, coypus are largely dependent on excavated roots and rhizomes. It would probably be difficult for a juvenile to excavate in frozen ground and as a consequence juveniles are thinner, on average, and many probably die from the combined effects of cold and starvation. It might thus be expected that larger numbers of juveniles would survive in milder winters. Some evidence that this is the case has been obtained by comparing the numbers of young in successive age classes in each of the last three years on the assumption that change from one class to the next reflects mortality. In fact the change is only valid as an index because large numbers of very young coypus die from natural causes and the youngest age class is thus underrepresented. The classes used were 0 to 10 weeks and 10 to 20 weeks. In 1970 the percentage change in numbers from the first to the second class was —28%, in 1971 —8% and in 1972 +4%. These data indicate a progressive increase in survival which would inevitably lead to proportionally higher recruitment to the breeding population. The improved survivorship was probably a result of the absence of prolonged periods with frozen ground, to "spring" growth in the winter of 1971/1972 and also to the better feeding conditions during the summers of 1971 and 1972 in contrast to the poor summer of 1970. All these factors would result in an improved food supply for suckling females and in increasing amounts of available food for weaning juveniles.

Population increase and control measures

It thus seems likely that reproductive success and juvenile survivorship have both increased in response to a succession of mild winters and highly productive summers in 1971 and 1972. These factors have caused the increase in population size which is reflected in the increased numbers killed. If we assume that the numbers killed are a true indication of population size, and this is partially confirmed by similar increase in the number of infestations reported, then we can calculate the rate of increase of the population. This increase has been exponential and can be described by the equation:

$$\log y = \log a + 0.019x$$

where "y" is the number of Coypu at a point in time t^2, "a" is the measured number of Coypu at a previous time t^1, and "x" is the number of months from t^1 to t^2.

This equation shows that given a population of coypus of between 8,000 and 11,000 in late 1972 (which was estimated to be the position) an increase of about 7,000 animals could be expected by the end of 1973 unless trapping efforts could be intensified. Accordingly, early in the year the decision was taken by local organisations and by the Ministry of Agriculture, Fisheries and Food to step up their financial contributions to "Coypu Control" and extra trappers have now been deployed. The intention is to review the position in April 1974 when it is hoped that the coypu population will have been reduced to a level that will allow a return to a small, permanent force of trappers. The size of this force will obviously depend on how many coypus are then at large, but it may have to be bigger than the five to seven men employed until recently.

ACKNOWLEDGEMENTS

I would like to thank Monica Wright and Ron Pimm who helped to collect the information presented here and Bob Spode who drew the graphs and maps. I am also grateful to R. A. Davis and Dr. E. W. Bentley who criticised the manuscript and to the trappers of Coypu Control for the supply of coypus.

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Classified notes

INSECTIVORA

Hedgehog (*Erinaceus europaeus*)

Reports received indicate a further increase, which is supported by the numbers seen on gamekeeper's gibbets, the most being 78 in the Brettenham district. A fairly mild autumn, perhaps coupled with the increasing habit of leaving food out, encouraged activity to the end of November but perhaps not as late as last year. An interesting series of Hedgehog deaths was recorded over about 14 miles of road between Hickling and Gt. Yarmouth during the year, showing a July peak.

JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
0	0	2	1	8	9	16	6	3	0	0	0

Mole (*Talpa europaea*)

In common with many other small mammals there are indications of an increase over the 1971 population. One line of corpses counted near Salthouse Heath contained between three and four hundred individuals.

A white specimen was caught near Raveningham during July near to where a litter of white moles was found in 1970.

Common Shrew (*Sorex araneus*)

There were many records of this species during the year throughout the county. A trapping programme conducted at Hoveton Great Broad showed this to be the most abundant mammal present with 45% of the captures being this species. The customary autumn deaths due to old age were noted, particularly in the first half of October.

Pigmy Shrew (*Sorex minutus*)

The usual ratio of Pigmy to Common Shrew in Barn Owl pellets of 1:11 was recorded at several places, except at Beeston St. Lawrence where numbers were equal. Parishes where this species was recorded included Upper Sheringham, Foxley, Heacham, Fleggburgh, Cromer, Wayford and Dilham.

Water Shrew (*Neomys fodiens*)

More records were received than for some years. Two were seen hunting along the edge of the Bure in April at Cawston and Little London; one was found dead during Sept. at Holkham Lake, and three were caught in Longworths at Hoveton. Barn Owl pellets collected in July at Beeston St. Lawrence, Coltishall, Dilham and Wayford all contained the remains of one or more.

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This male Long-eared Bat was flying inside Norwich Castle on the evening of March 9th, having emerged from hibernation early in the mild spring. It was released outside after being photographed.

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The alarming spread of American Grey Squirrels in Norfolk during 1970/1 seems to have slowed down, if not actually stopped due no doubt to control pressures. Although a fascinating animal, the extinction of the native Red Squirrel would doubtless follow if it became widely established.

Pipistrelle (*Pipistrellus pipistrellus*)

Numerous Pipistrelle records demonstrate how common this species is. The period for general emergence was the third week in March, although a "small cloud" of bats, possibly this species, was at Little Melton on the 9th.

Several large "maternity colonies" were reported again, the largest being more than 352 at Rollesby. When these were captured for examination on July 5th, 98% had already given birth. At Easton on a June evening, a Pipistrelle appeared to be carrying a young one clinging to its underside while rather clumsily flying at head height along a road.

There were many Oct. sightings, and the last recorded one was in the afternoon of Dec. 14th at Thorpe Hamlet School.

Long-eared Bat (*Plecotus auritus*)

Over a dozen records received. This included six roosting in a hollow acacia at Greshams School; one roosting at Whitlingham April 12th at a roost first mentioned in the 1964 Report; one picked up dead at Snettisham Sept. 26th and one flying around *inside* the Castle Museum, Norwich, on March 9th.

Daubenton's Bat (*Myotis daubentoni*)

Early in the year up to seven were still hibernating in the Attlebridge roost while several were again in the Brinton ice-house.

Work continued on re-opening the Daubenton Chalk Caves roost at Eaton and on Aug. 4th a Norfolk Young Naturalists' work-party broke through. Clearance work was soon completed and a padlocked iron grille was erected to control human access. The effort was rewarded with two Daubentons in the chalk pit on Dec. 4th, one of which successfully hibernated through the whole winter in one of the two caves. (See the *Bull. Geol. Soc. Norfolk* No. 24, 3–14, for an article on the Eaton Caves.) By Nov. 12th only one had re-occupied the Attlebridge roost.

Natterer's Bat (*Myotis natterei*)

Seven localities were noted. Early in the year hibernating animals were found at Attlebridge (3), Easton (1), Weybourne (2) and Brinton (several), and one was squashed on the road at Swanton Morley, March 21st.

Noctule Bat (*Nyctalus noctua*)

Eleven parishes were named in this year's records. An early one, on April 18th, was found in a Framingham Earl bedroom, while a very late one was seen at Swanton Morley on Oct. 31st. The summer roosts at Stoke Holy Cross and Ludham were occupied again, first by Starlings, then by bats. The peak count at Ludham reached 63 on May 22nd.

Roe Deer doe was photographed browsing on grass in the Thetford area. are the most numerous deer and appear to be increasing and expanding their range in Norfolk.

ight *P. Richards*

Bank Vole (*Clethrionomys glareolus*)

Only two records of any significance were received, which is unlikely to give a fair representation of the status and distribution of this species. In a series of trappings with Longworth small mammal traps at Hoveton Great Broad during August and September, mainly in "carr", no Bank Voles were recorded, although Wood Mice were; frequently the two species co-exist.

Short-tailed Field Vole (*Microtus agrestis*)

Again the records for this species were fewer than usual, and the predicted build-up in numbers had only occurred in the Breydon Marshes area by the year's end when numbers of Short-eared Owls arrived to feed on them. Two animals were caught in the Longworths set at Hoveton Great Broad in the reed-bed areas which are surrounded by water and "carr". On the north coast in August nests of 3 and 5 were found at Burnham Market, in a garden refuse heap, and at Cley in an old, and partly flooded, Black-headed Gulls nest.

Water Vole (*Arvicola amphibius*)

The impression gained from the records submitted is that this vole was plentiful, particularly in the Corpusty area where observations revealed that about 80% were black in colouration. A single black animal was also reported at Wynd's Bridge, in the Fens. Another dark specimen was captured on May 16th, in a North Walsham garden, after eating a quantity of roots from a much valued broccoli crop.

Wood Mouse (*Apodemus sylvaticus*)

This was the most widely reported species of small mammal. Eleven were caught in the "carr" at Hoveton Great Broad, in August–September; 6 were caught at Stockton at the same time, while at the Blakeney Point Ternery 9 were caught in July at a hoard of seeds. At Taverham the ratio of Wood Mice to Voles, trapping and captures by the cat combined, was about 8:1.

A subjective assessment of status at present is of a static population although a Corpusty observer considered that numbers had dropped and crocus corms were not eaten during the winter months this year.

Harvest Mouse (*Micromys minutus*)

Reported from several localities named in previous reports, including one caught by a cat at Caistor St. Edmunds on July 22nd. They are probably more widely distributed than is generally supposed, so it is hoped as many records as possible will be forwarded to help complete our picture of its distribution. The 10 kilometre square distribution based on the records from the past 20 years is:
West: 50, 62, 64, 69, 70, 72, 74, 78, 80, 81, 84, 90.
East: 02, 03, 04, 07, 10, 11, 12, 13, 20, 21, 22, 29, 30, 31, 32, 33, 39, 40, 42, 49.

House Mouse (*Mus musculus*)

The population appears to have decreased once again judging by all accounts. Observers at Foxley and Corpusty particularly comment on this and it is wondered if an increase in the following species is correlated in any way.

Brown Rat (*Rattus norvegicus*)

The Brown Rat is still all too common throughout the county. Interesting reports included an observation of them feeding on spawning Common Toads at Brinton, while they also accounted for "over 500" eggs on the Blakeney Point ternery. The presence of some numbers in areas of saltmarsh and remote marshland occasionally makes one wonder exactly what they find to feed on. A feeding observation of one on a riverside "rond" near Reedham in December eating reed rhizomes serves to show how adaptable the species is.

Several white examples were recorded in December in North Creake, Burnham Norton and Burnham Market.

Coypu (*Myocastor coypus*)

With a succession of mild winters the Coypu is on the increase again. Over 100 were trapped at 4 sites, Hickling, Wickhampton, Halvergate and Haddiscoe. Peak kills were in March and November when over 800 were accounted for. The total East Anglian figure for the year came to 3,252. An article on this remarkable increase appears on pages 49–59.

Red Squirrel (*Sciurus vulgaris*)

There is little change from the general population trend in 1971. The Breckland population was a little depleted, though the North Norfolk animals seem to have suffered little from the "red squirrel disease" and the Wells pine woods hold a thriving colony. In the Suffolk Brecks two 1,000 hectare blocks of forest have been set aside by the Forestry Commission specifically for the conservation of the Red Squirrel.

The first recorded young of the year were born during the first week of March at Horsford and by early May two females regularly visiting an Ashwellthorpe garden were thought to have young in the vicinity.

Grey Squirrel ((*Sciurus carolinensis*)

The Grey Squirrel advance during 1972 was far less dramatic than in the previous two years. Although numbers have increased in some of the already established areas there were few new areas occupied. This is no doubt due in part to the control pressures applied – for instance over 70 were on one breckland gibbet.

One was shot at East Winch, May 26th (TF 61), and another was caught in an unbaited Coypu trap alongside a dyke at Wheatfen Broad on Dec. 20th.

All possible sightings are still required so as to document their inevitable spread in this county.

LAGOMORPHA

Rabbit (*Oryctologus cuniculus*)

As in 1971 the increase in numbers appears to have continued and this has no doubt been assisted by a series of mild winters and the apparently increasing resistance to myxomatosis.

On June 9th in a Mulbarton garden an intriguing observation was made concerning a young rabbit which was playing with four Magpies. Equally interesting was a record of breeding in January received from Ranworth.

Hare (*Lepus europaeus*)

From Breydon and North Norfolk come reports of an increase, which is supported by game records. However, other observers consider there was a continued decline with only 10 pairs on 1,000 acres at Sparham, so the trend for the county is not uniform.

An increase appears to have occurred at Blakeney Point where they were thought to have been feeding on Sea Holly during May.

CETACEA

Porpoise (*Phocoena phocoena*)

There were 6 spring and 7 autumn sightings of Porpoises this year. A school was watched at Hunstanton travelling out of the Wash on March 23rd, and a single in the Wash, April 2nd. A further two were observed off Hunstanton on April 9th apparently feeding in a small area, rather than heading in any particular direction. Another single was in the Wash on May 24th and a dead one washed up on East Hills, Wells, on the 31st with a further one in the Wash on June 6th.

The autumn records included a large school at Cley September 8th; 3 eastwards at Weybourne on the 15th, and a dead one on Sheringham beach later in the month. Another dead one appeared on October 27th this time at Winterton, and 2 days later another single was spotted in the Wash, while November 5th produced one east at Cley and another east at Salthouse.

Pilot Whale (*Globicephala melaena*)

A group of eight or more cetaceans over 20 feet long were seen at Cley on August 20th and considered to be this species (TQG).

Common Dolphin (*Delphinus delphis*)

A skull, probably of this species, found on Holkham beach in December (RPB-O).

CARNIVORA

Fox (*Vulpus vulpes*)

A further slight increase seems to be apparent in the county again this year with slightly more reports than in previous years. It was not uncommon for observers to see odd individuals during the hours of daylight, especially in the months of January to April and again in December, as well as sightings in car headlights. Several people enjoyed tracking foxes in the limited amount of snow we had early in the year, while even more people came to realise that you can actually smell where a fox has been!

A distribution map is being prepared for next year's report so all sightings are still wanted, as are any dead vixens to enable an embryo count to be made.

Badger (*Meles meles*)

The general picture seems to have changed very little since the 1970 report was produced (AEV). There are still only about a dozen occupied setts known in the county. Two were seen in different parts of mid-Norfolk crossing roads after dark in February and September, while reports of singles seen just to the north and to the south-west of Norwich suggests there are still undiscovered setts in these areas. One north Norfolk and one west Norfolk sett was said to have been extended a little, and a sett was apparently uncovered during road-works to the west of Norwich. Plainly insufficient encouragement has been given to our Badgers to provoke an increase.

Mink (*Mustela vison*)

No definite records of this animal were sent in during 1972, so we have cause to be grateful that this animal is not colonising Norfolk as it is some other counties. In the Journal of Zoology (**167**, 463, August 1972), Drs. M. G. Day and I. Linn reported on a survey of Mink food in England and Wales and found that ⅓ of the food was birds and ⅓ mammals, and the remainder was fish, insects and reptiles. The Rabbit was the most important mammal food, with Rats and Water Vole also important. They concluded that Mink had found a vacant ecological feeding niche in Britain and posed no real threat to native British species, though they might be competing with Otters for food.

Ferret (*Putorius furio*)

Three were reported, almost certainly recent escapes. At Framingham Earl on January 3rd one was seen in car headlights; at East Carlton on April 11th a very dark coloured specimen was found dead, tangled in garden nylon netting, and one dead on the "Acle Straights".

Common Seal (*Phoca vitulina*)

Once again the main seal interest was centred on the Wash. Hunting took place again in July under Home Office licence and 380 pups, were taken, although not without the by now customary airing of views in the local press. There was a certain amount of disturbance in the southern Wash by parties involved with the Wash Feasibility Study, but when construction starts it should only affect a small part of the seal population. If long-term plans for more of the Wash to be reclaimed are put into operation, then obviously more will lose their breeding areas.

The total number of pups born in the Wash in 1972 was estimated at 1,200, by the tagging method described in last year's report. This is some 700 less than in 1971 and represents a 37% reduction in numbers born, but the Seals Research Unit does not consider this to represent a significant decline in the total population. The first pups of the year were seen on June 29th.

An interesting series of counts were made on Seal Sand in the Wash throughout the whole year. Numbers peaked 200 on April 9th when an estimate was made by searchlight (DLO).

Recoveries of seal pups tagged in the Wash have come from Lowestoft, Thorpeness, Felixstowe and Maldon to the south and Spurn Point, Withernsea, Bridlington, Flamborough Head, Hartlepool and North Berwick to the north. Overseas recoveries have come from Ostend, Dunkirk and Wester Schelde.

Other interesting reports from the Wash area, both in June, included one on the River Ouse as far up as Eau Brink, Tilney and another at King's Lynn eating Mallard ducklings.

At Blakeney Point regular counts were made from May–August (PRC). These included a high of 220 in two distinct herds on May 7th, and showed that at least 12 pups were born there. This herd seems fairly "tame" and on August 14th a man was seen swimming with them and eventually "hauled out" himself, only a few feet away from the nearest.

On Scroby Sands there is still a thriving colony, numbers being about the same as last year with a small number of pups born in the last week of June and beginning of July.

Inland records came from Oulton Broad and in the Wensum in Norwich, both at Christmas time.

Grey Seal (*Halichoerus grypus*)

Scroby Sands is the main haunt of Grey Seals on this east coast with over 100 frequently seen, and more than 20 pups were born there in December and January. These seals breed some weeks later than those occurring further north in the British Isles.

One tagged at Scroby on December 17th, weighing 48 lbs., was alive and healthy at Bacton on January 8th where it was returned to the sea to continue its "jaunts" (PGT).

Although the small colony is still present in the Wash, no pups were reported in this area.

Otter (*Lutra lutra*)

Information received was rather more than last year, possibly due to an increasing awareness of the threat to this animal.

In 1971 the report of activity on the Babingley in TF 63 should read TF 62. This year's report is again presented on a 10 kilometre square basis:

WEST	74.	Signs of activity on the Broadwater in Aug.
	84.	Tracks found on Scolt Head Island in March.
	88.	Signs of activity on the Little Ouse where the Forestry Commission have given this animal full protection.
	89.	Several sightings, including cubs in this area where some measure of protection has recently been given.
	92.	Seen regularly on this stretch of the Wensum (RPB-O).
	94.	"Seals" in the mud of coastal salt pans where shore crabs had been eaten.
	98.	Present on the Little Ouse at Shadwell Park where Otter hunters met in August.
EAST	00.	One heard "whistling" in a reed bed in the area (RPB-O).
	01.	Seen during the autumn and more than one pair thought to be present.
	03.	"Spraints", "seals" and the remains of a Pike, beside Brinton Lake.
	04.	Present on the Cley Marshes Reserve.
	10.	One killed on the road at Colney in November.
	11.	"Spraints" and fish remains especially noticeable on this part of the Wensum in the autumn. A road casualty at Drayton on Oct. 29th (SLHB).
	13.	Said to be present in this square.
	17.	"Spraint" recorded in Jan. on the Waveney near Diss.
	42.	At Hickling signs were noted at three places during the year. At Horsey there were fewer signs than in previous years, due, it is thought, to an increase in broads traffic.
	49.	A May sighting was made in this square.

This list of observations speaks for itself. Nowhere in the county do Otters occur as frequently as they did even ten years ago. A more formal Otter survey has now been launched (see last year's Report) and observers with about one day per month to spare are needed to assist.

After last year's mention of the Otter hunters Mr. S. L. H. Babbage, Master and Huntsman of the Eastern Counties Otterhounds, has requested us to print the following report:

"The Eastern Counties Otterhounds drew water systems in Norfolk on 14 days during April to September 1972 and found 8 Otters with no blank days. Otters were hunted for up to two hours and the hounds were then drawn off to avoid a kill, especially with bitch otters. Only one was accounted for – an old dog Otter going back in condition.

This was in line with the policy operative since 1969, following the interim report of the Otter Survey sponsored by the Mammal Society. In order to help the increase of otters the Masters of Otterhounds Association accepted the recommendations of the British Field Sports Society for the modification (or in some cases, cessation) of hunting in certain areas. The policy we then accepted remains in force and we have continued to co-operate in the survey. A report on the last three years was sent in, for the Mammal Society's further report in 1973.[1]

We also co-operate with the Nature Conservancy Experimental Station at Monkswood and one liver was sent there for analysis of residual pesticides. It appears that in East Anglia these are at a safe level in relation to breeding.[2]

The wishes of landowners and other interests are respected.[3]

It is *my* view that otters are on the increase. We found otters on the Rivers Bure, Stiffkey, Wavency, Wissey, Ant and Thet. Having lived in the area for many years and taking into account the vast water shed of the Broads and coupled with observations of the work of otters in this, an area largely not drawn by our hounds, I would estimate that the number of otters in Norfolk may well be in the region of 150."[4]

Editor's comments:

[1] We gather that preliminary analysis by the Mammal Society shows there has been no observed recovery of the species in south and eastern England. The report with its recommendations is still awaited.
[2] It is not possible to assess general levels from a single liver.
[3] We accept that under Mr. Babbage more care has been taken to obtain permission to hunt property, though land ownership patterns are very complex and can cause difficulties.
[4] Our estimate of the total Norfolk population is considerably below 150.

Stoat (*Mustela erminea*)

More reports than last year and considered to be frequent in most areas. Up to 29 were seen on a single gamekeeper's gibbet, though most reports of this nature recorded smaller numbers. One was recorded in the Scolt Head Island ternery in June and July, but only fed on Rabbits, although its tracks were found within inches of Common Terns nests.

Three white stoats were caught near Great Snoring and a single was seen in Jan. on Fleggburgh Marshes.

Weasel (*Mustela nivalis*)

There were over 60 individual sightings reported this year and although reported as common, one observer considered numbers had dropped in mid-Norfolk.

Two especially interesting sightings were made. On March 31st between Cockthorpe and Binham one approached along the road very close to the cycling observer. The animal darted into the hedge at the last minute, dropping the mouse it was carrying, which lay still for about a minute before it got up and ran off into the hedgerow opposite. Norwich City Hall steps was the most unlikely venue for another Weasel which was spotted on Aug. 10th.

ARTIODACTYLA

Red Deer (*Cervus elephas*)

The total Norfolk population has changed little since 1970 when it stood at a little over 100.

Several "wallows" which are used particularly during the rut were located, and one group of 15 hinds and a stag were seen at Bridgham Heath on Dec. 3rd.

Away from the usual areas a young stag and four hinds were watched grazing at Cranworth, April 21st, and one was seen on a Stoke Ferry farm, June 10th. Sub-fossil, broken antlers came from Titchwell beach and a dyke near Hickling Broad.

Fallow Deer (*Dama dama*)

Wild herds of Fallow Deer exist at only two places in Norfolk, but herds are maintained at Great Witchingham, Melton Constable, Holkham and Houghton. At the latter park on April 11th at least 45 white animals were visible from the public road.

In the Horsford area it was considered that there were two groups of about 10, chiefly dark in colour. One young animal was nearly stepped on in this area in the spring before it bounded away. The scattered animals in the King's Lynn area were detected more from their slots than from sightings, although one pale coloured buck and three does were seen at Castle Rising.

Roe Deer (*Capreolus capreolus*)

Numerous sightings throughout the Breckland area, while sightings at Castle Rising and West Newton again indicates the presence of Roe in the west. A very marked figure of 8 rutting ring was seen at Mundford.

The most outstanding record of the year concerns a partly albino Roe doe kid injured by a vehicle on Aug. 4th, on the Thetford Chase. The animal's haunches, back legs, shoulders and head except for one ear were white; its saddle was the normal colour. This is apparently the first occurence of a Skewbald Roe in this area (RW).

Muntjac Deer (*Muntiacus reevesi*)

Only four records of this elusive species.

On about April 14th a slightly injured one 18 inches high turned up on a farm at Wisbech in the Fens. At Castle Rising, characteristic slots were found; at Hillington on Oct. 6th one was seen in car headlights (RPB-O) and at Hedenham later in the month another was flushed in a wood (EAE).

Chinese Water Deer (*Hydropotes inermis*)

Partly as a result of an appeal for information on Chinese Water Deer in the local press in early 1973, we now have an improved knowledge of this species. Reports of more than a dozen individuals were received.

The Broadland parishes of Hoveton, Woodbastwick, Ranworth, Ludham, Catfield, Stalham, Hickling and Potter Heigham all have some and probably originated from animals which escaped from Horning and Stalham. A Fawn was seen at Ranworth and one was said to have been found dead in a Coypu trap near Catfield. An immature male knocked down and killed at Hoveton March 22nd weighted 8.4 kg. and had some unfortunate "mange" in its coat giving it a "shorn appearance" over much of the body.

Near Thorpe Market numerous tracks were found in December (RPB-O) and at Cley on the evening of May 1st, one emerged from a reedy ditch and was watched for five minutes. On the eastern end of Scolt Head Island tracks of three were found on June 1st amongst the dunes and leading down to the beach to disappear under the rising water (CPP). A report of "three young Red Deer" on Titchwell Marsh in mid-June were surely the same animals.

All sightings of small deer are wanted.

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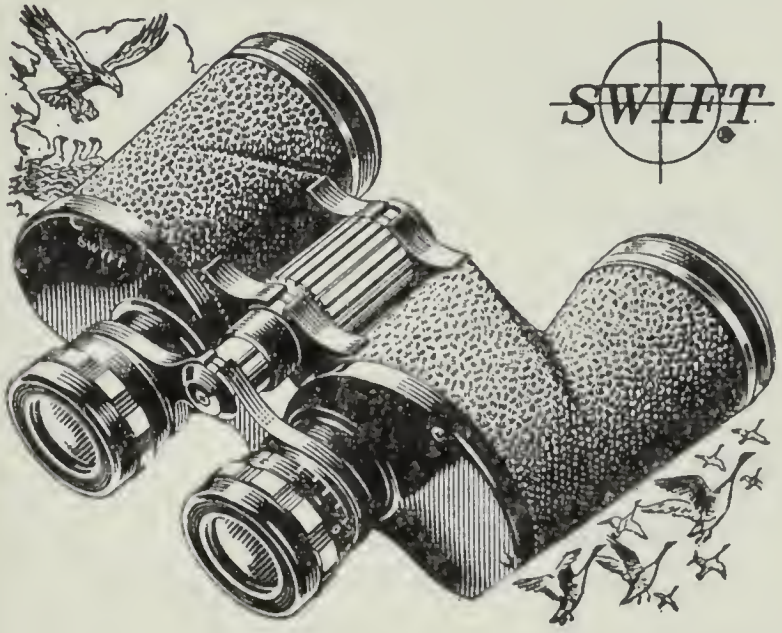

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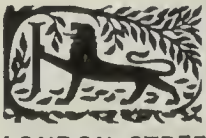

JARROLDS

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Norfolk Naturalists Trust Properties

Date Acquired		Acreage		Status*
	On the Coast			
1926	Cley Marshes	435	Gift	S.S.S.I.†
1937	Duchess's Pightle, Burnham Overy ..	1	Gift	——
1937	Great and Little Eye, Salthouse ..	10	Purchased	S.S.S.I.
1945	East End of Scolt Island	76	Purchased	N.N.R.
1955	The Eye, Salthouse	21	Purchased	S.S.S.I.
1965	Holme	400	Purchased, Gift & Agreement	S.S.S.I.
1971	Salthouse Marshes	200	Agreement	S.S.S.I.
	Broadland			
1928	Starch Grass, (Martham)	26	Purchased	S.S.S.I.
1930	Alderfen Broad	72	Purchased	S.S.S.I.
1945 and 1969	Hickling Broad	816	Purchased	N.N.R.
1945	,, ,, ...	500	Leased	N.N.R.
1945	Barton Broad	355	Half Gift &	S.S.S.I.
1952	,, ,,		Half Purchased	S.S.S.I.
1948	Surlingham Broad	253	Purchased	S.S.S.I.
1949	Ranworth Broad	124	Gift	N.N.R.
1949	Cockshoot Broad	12	Gift	N.N.R.
1964	Firs Marsh, Burgh St .Peter	2½	Leased	——
1971	Martham Broad	103	Leased	S.S.S.I.
1972	Hardley Flood	90	Leased	——
1972	Chedgrave Common	10	Leased	——
	Breckland			
1938	East Wretham Heath	362	Purchased&Gift	S.S.S.I.
1942	Weeting Heath	343	Gift	N.N.R.
1949	Thetford Heath	250	Gift	N.N.R.
	Other Areas			
1957	Thursford Woods	25	Gift	——
1960	Hethel Old Thorn	⅛	Gift	——
1961	Scarning Fen	10½	Gift	S.S.S.I.
1962	Hockham Fen (Cranberry Rough) ..	20	Purchased	S.S.S.I.
1963	Roydon Common	140	Purchased	S.S.S.I.
1966	Stoke Ferry Fen	25	Agreement	S.S.S.I.
1968	Lenwade Water	37	Agreement	——
1968	Dickleburgh Pightle	1	Agreement	——
1972	Smallburgh Fen	19	Leased	S.S.S.I.
1972	Ringstead Downs	26	Agreement	S.S.S.I.
1973	East Winch Common	80	Gift	S.S.S.I.

In addition, the Trust shares with the National Trust in the management of the coastal reserve at Blakeney Point (1,335 acres), and it manages Arnold's Marsh, Cley (29 acres) on behalf of the National Trust.

By agreement with the Nature Conservancy, Scolt Head Island, Ranworth Broad, Hickling Broad, and the Breckland Heaths now form part of the National Nature Reserves.

*Status: N.N.R. denotes National Nature Reserve
S.S.S.I. ,, Site of Special Scientific Interest

†In 1966 Cley Reserve was established as a Bird Sanctuary under the Protection of Birds Act, 1954.

Registered Office of the Trust: 72 Cathedral Close, Norwich, NOR 16P
Tel. Norwich 25540

Details of membership will be sent on request.

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NORFOLK Bird Report 1973

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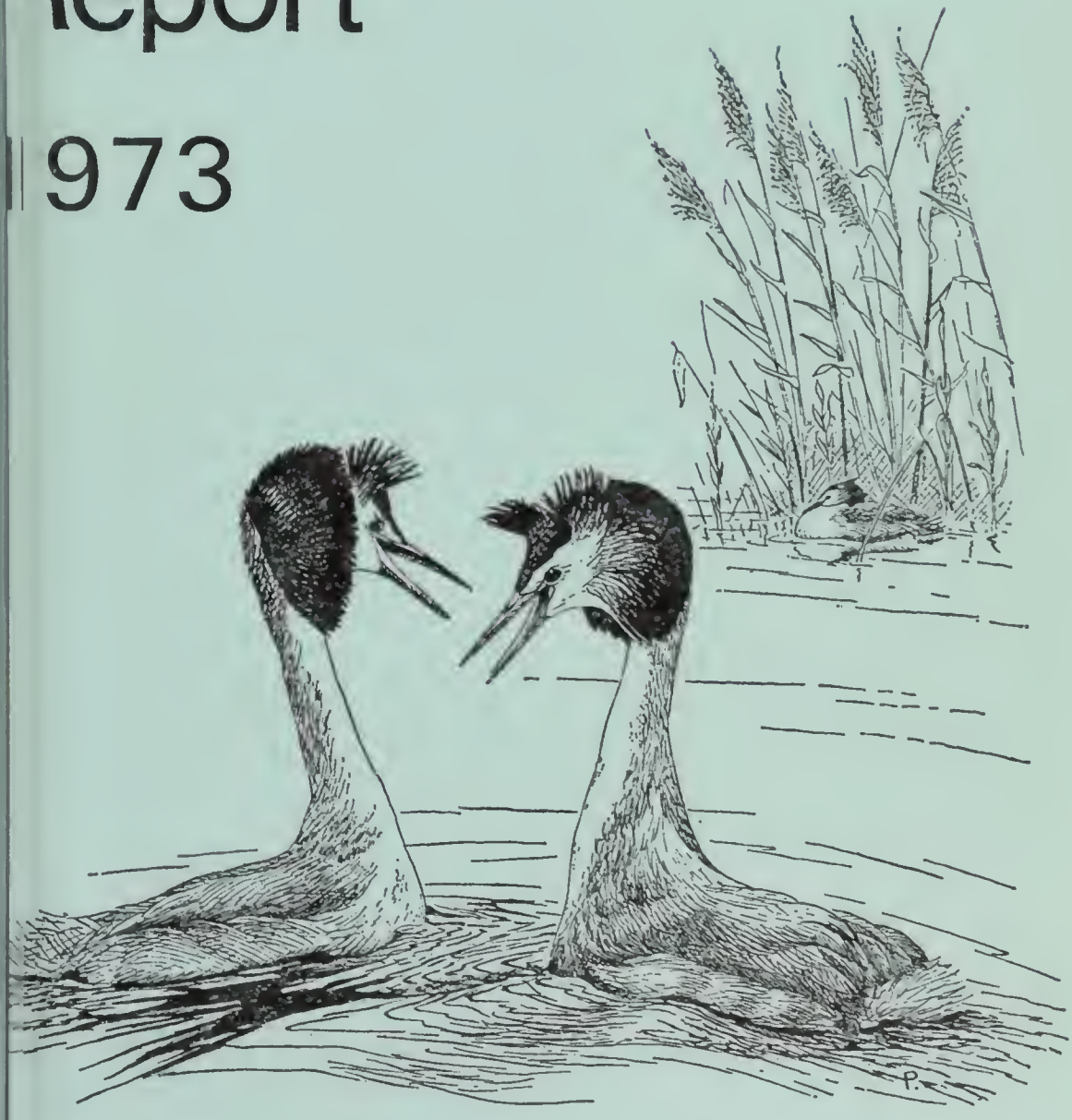

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Norfolk Bird Report - 1973

Editor: MICHAEL J. SEAGO
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Norfolk Mammal Report - 1973

Editor: JOHN G. GOLDSMITH

The Editor regrets the delay in publication.
A double issue will appear in the 1974 Report.

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NORFOLK BIRD REPORT 1973

Editorial

Weather . . . Review of The Year . . . Road Casualties . . . Acknowledgements Recording.

The Council of the Norfolk Naturalists Trust, in co-operation with the Norfolk and Norwich Naturalists' Society, is pleased to present the annual report on the birds of Norfolk.

The Weather: A noticeable feature was the dry winter and early spring sunshine was well above average with June and the late Autumn months (particularly Nov.) being much above normal. March, in fact, was the driest since 1961 and anticyclonic weather predominated for most of the month.

Depressions at the beginning and end of the month resulted in April being the wettest for eight years. May began with unsettled weather and heavy rain but an anticyclone developed after the 11th. June was very sunny, but July cool and wet with numerous fronts bringing thunderstorms. The pattern was repeated in the following two months: August was the sunniest since 1939, and September the wettest since the notorious September of 1968.

October was the coldest for 9 years, followed by the sunniest November since 1925; the latter month also contained some of the lowest November temperatures experienced for many years. December was largely unsettled.

Review of the Year: 1973 will be remembered for its large-scale autumn invasion of Rough-legged Buzzards from Northern Europe. It is not possible to indicate the number involved, but as many as 9 appeared at Cley in a single day. Among May surprises bound for the Far North were Red-throated Pipit and 5 Grey-headed Wagtails. At the same time and perhaps surprisingly, was a Black-headed Wagtail. This form breeds in the Balkans, but many authors have described yellow wagtail sub-species of different geographical origin mixing freely on their wintering grounds as well as on migration. Among other Northern surprises was a spring-time Broad-billed Sandpiper and an autumn Arctic Warbler. A total of 10 Sabine's Gulls from the Arctic tundra delighted observers during September.

Eastern Europe provided a succession of exotics: 7 Red-footed Falcons, 2 Rollers, White-winged Black Tern, Gull-billed Tern, 12 Barred Warblers, 13 Red-breasted Flycatchers and Scarlet Rosefinch. From the Baltic came 2 magnificent Caspian Terns.

Wanderers from Southern Europe were less plentiful, but included Alpine Swift, Bee-eaters and Lesser Grey Shrike. Two 'regular' species from Asia beyond the Urals again featured: 8 diminutive Yellow-browed Warblers and 3 Richard's Pipits.

Eleven North American birds provided exciting days for fortunate observers: Lesser Yellowlegs (3), 3 White-rumped Sandpipers (13), 5 Pectoral Sandpipers (63), Buff-breasted Sandpiper (9) and Wilson's Phalarope (4). County totals for these New World vagrants, including those published in *Birds of Norfolk* (1967) are given in brackets.

There were two additions to the county list: Cetti's Warbler, which had been ringed in Belgium and Sardinian Warbler from the Mediterranean.

Notable breeding birds included over 50 pairs of Tufted Ducks, Montagu's Harrier (unsuccessful due to disturbance), 15 pairs of Little Ringed Plovers, Black-tailed Godwits, 2 pairs of Herring Gulls, Common Gull, 316 pairs of Little Terns, 4300 pairs of Sandwich Terns, Short-eared Owl, 17 pairs of Black Redstarts and 12 pairs of Red-backed Shrikes.

Road Casualties: Along a five-mile stretch of the A47 between Yarmouth and "Stracey Arms" totalled 111 birds as follows: 51 Moorhens, 36 Black-headed Gulls, 2 Barn Owls, 6 Lapwing, 3 Blackbirds, 6 House Sparrows, 2 Meadow Pipits and single Kestrel, Mallard, Mute Swan, Redwing and Common Gull.

Acknowledgements: Thanks are due to R. Powley for the cover drawing and for text illustrations; also to D. Avon, the late R. P. Bagnall-Oakeley, Dr. K. J. Carlson, *Eastern Daily Press*, G. M. S. Easy, Mrs. P. Harrison, S. C. Porter, C. P. Robinson and T. Tilford for photographs and vignettes; to Holme Bird Observatory/N.O.A. for access to their records; to the Norfolk Naturalists Trust Wardens; to R. H. Harrison (Breydon); to the National Trust (Blakeney Point); to the Nature Conservancy (Scolt Head, Holkham, Bure Marshes (Woodbastwick) and Hoveton Great Broad); to J. Buxton (Horsey); to the Cambridge Bird Club (particularly to G. M. S. Easy); to Gt. Yarmouth Naturalists Society; to Heacham and West Norfolk Nat. Hist. Society; to D. A. Dorling for compiling the annual record cards; to Mrs. M. Dorling, J. T. Fenton, Mrs. P. A. Rix, Mrs. S. F. Seago, C. & R. Seago for valuable assistance and to all other contributors.

Recording: Records for 1974 Report should be sent **by the end of February** to Michael J. Seago, 33 Acacia Road, Thorpe St. Andrew, Norwich, NR7 0PP. Contributors are requested to submit notes in the order followed in B.T.O. Guide 13 (*A Species List of British and Irish Birds*). In order to minimise the work involved, records will not normally be acknowledged. The names of all contributors will be included in the Report.

Original articles are also welcomed. They should be submitted, type-written if possible, to the Editor, who reserves the right to revise such papers for publication in accordance with current editorial policy. Proofs of all contributions will be sent to authors before publication.

New members may be assured that their observations are appreciated and are recorded on an annual card index. However, as the normal pattern of events has been well established after a lengthy series of Reports, there is more opportunity for summary and not so much need to document less unusual occurrences. Observer's initials are normally reserved for the really unusual contributions.

Migration

BREYDON WATER
Local Nature Reserve

January wildfowl totals were low following mild weather: 600 Wigeon, 362 Shelduck, 120 Pintail, 41 Scaup, 6 Goldeneye, 3 Goosanders (on 27th) and 10 Pochard. Grey geese again declined and 30 White-fronted Geese on 30th and 8 Pink-feet (accompanied by a Barnacle Goose on 14th) were peak totals. A single Brent Goose remained three days.

500 Golden Plovers and a Ruff were noted on 14th, 36 Hooded Crows on 2nd and up to 80 Short-eared Owls at Halvergate during the first half of the month. The same area produced 11 Lapland Buntings and 22 Corn Buntings on 17th and Stonechat on 7th. A dead Black-throated Diver was picked up on 21st.

February opened with Hen Harrier when Short-eared Owl numbers had declined to a dozen. Wildfowl included 153 Pintail, 550 Wigeon, 12 Goldeneye, 35 Scaup and a Goosander. Bewick's Swans were much in evidence on the adjoining marshes: 59 on 5th, 73 on 12th and 61 on 18th. 32 White-fronted Geese fed on the fresh marshes south-west of the estuary. Several Lapland Buntings stayed until 23rd.

March also opened with Hen Harrier. The White-fronted Geese departed on 4th when a Water Pipit appeared. Diving ducks were in evidence: 20 Pochard, 27 Goldeneye, 18 Tufted and 22 Scaup. 100 Pintail were estimated on 14th when 20 Great Crested Grebes were present. Among surprises were 4 Bearded Tits (one carrying a ring) in an adjoining dyke on 22nd and Black Redstarts in ones and twos from 26th.

Early April was quiet apart from 2 Water Pipits on 2nd. First Swallows appeared on 16th, Yellow Wagtails on 17th and Sand Martins on 21st. Avocet was new on 15th followed by 3 on 23rd. Waders included 40 Bar-tailed Godwits on 24th, Whimbrel from 22nd, Greenshank and Spotted Redshank in twos and threes and single Black-tailed Godwit. An immature male Black Redstart was regularly singing on buildings at the eastern end of Breydon during the month.

Highlight of May was 3 Avocets which stayed all month and were observed displaying on several occasions. Arctic-bound waders were a feature of the opening week: up to 7 Greenshank, 3 Spotted Redshank, 24 Whimbrel, 62 Bar-tailed Godwits and 16 Black-tailed Godwits. Two red Curlew-Sandpipers made the 20th notable. Also of interest were 2 Spoonbills on 11th (with one on 22nd), Hobby and Little Ringed Plover on 13th and 2 Little Gulls on 26th. Up to 6 Black Terns passed through on several dates; Marsh Harriers were noted on 20th and 27th.

June, as usual, was quiet apart from single Spoonbills between 9th and 28th (with 2 on 13th). 2 more Avocets came in on 11th, Hooded Crow on 9th, 2 Wigeon on 11th and 2 Black Terns on 13th. Breeding birds included two new species for

Breydon: Little Tern and Bearded Tit; 2 pairs of each bred, the former rearing one flying young. Other breeders included 8 - 10 pairs of Little Grebes, 5 pairs of Oyster catchers, 2 pairs of Ringed Plovers and declining numbers of both Redshank and Lapwing. A pair of Gadwall nested; also a pair of Barn Owls. Among new features were 3 pairs of Corn Buntings in the area and up to 24 summering Great Crested Grebes.

July opened with Spotted Redshank, Whimbrel and Green Sandpiper followed by Spoonbill on 2nd. 3 very tired Spoonbills came in from the sea on 7th. Common Sandpipers had returned by 10th and Greenshank and Turnstone on 14th. 5 Avocets were welcome visitors on 20th with 56 Dunlin including birds of the year on 25th.

An adult male Marsh Harrier was notable on 2nd and the first 3 Curlew-Sandpipers arrived on 3rd; parties up to 16 were on the muds all month. Another Avocet was spotted on 3rd with 7 west on 11th. Other waders were scarce although 2 Black-tailed Godwits came on 8th with 6 more on 28th. Up to 3 Ruffs passed through and Curlew peaked at 70. The first 11 Wigeon returned on 28th.

September produced few surprises apart from Avocet on 16th and Grey Wagtail on 27th. Among the month's waders were 9 Greenshank, 12 Curlew-Sandpipers, 86 Curlew, 9 Bar-tailed Godwits and Spotted Redshank. The first autumn Rock Pipit arrived on 14th.

Early October arrivals were Scaup and Twite on 4th and Jack Snipe, Richard's Pipit and Shorelark all on 7th. Among wildfowl were 339 Wigeon and 53 Pintail. Single Spotted Redshank passed through until 21st with Greenshank and 10 Bar-tailed Godwits on 31st. 2 Stonechats were new on 25th, 3 Bearded Tits at Berney Arms on 28th and Hen Harrier on 30th. 60 Twites and 6 Snow Buntings were present at the month end.

November 1st saw the first 9 Bewick's Swans of the winter (5 were immature); 3 Pink-footed Geese also arrived. An Avocet was an interesting arrival on 3rd, it remained during a cold spell until 8th December. 12 Bewick's Swans came on 17th followed by Sparrowhawk on 20th and Peregrine on 22nd. A late Swallow headed south on 9th. 4 late Greenshank lingered until 17th and other notable birds were 6 Hooded Crows on 25th and 21 Shovelers on 30th.

December wildfowl counts were high: 2,000 Wigeon, 682 Shelduck, 141 Pintail, 154 Mallard, 120 Teal, 33 Goldeneye, 5 Scaup, 14 Tufted and 5 Gadwall; also 37 Brent Geese (for several weeks), 2 White-fronts and 2 Bean Geese on 9th. Bewick's Swans were again in evidence with 72 on 16th and 2 herds totalling 118 on 30th.

Peregrine was new on 8th and female Blackcap in a dykeside on 9th. Cormorants peaked at 131 on 2nd when 30 Little and 13 Great Crested Grebes were counted. 10 Jack Snipe and Common Sandpiper were reported on 9th. In contrast to the beginning of the year only single Short-eared Owls were found. 60 Snow Buntings were in evidence at Christmas, but only a single Lapland Bunting.

CLEY AND SALTHOUSE

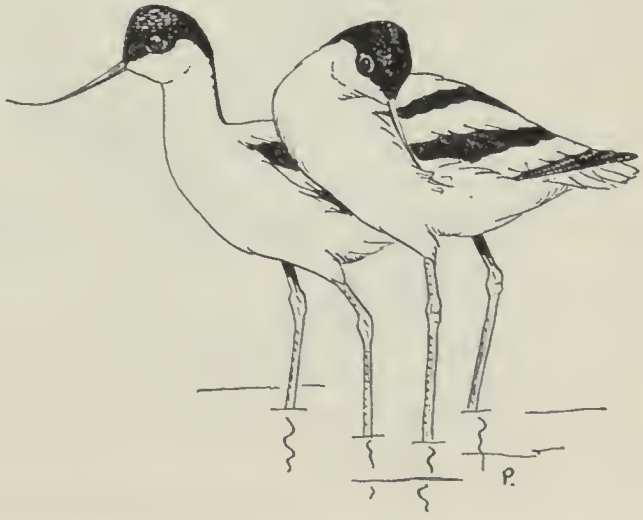
Highlight of the early part of the year were up to 80 Shorelarks and 300 Snow Buntings which were often accompanied by 14 Lapland Buntings. Despite mild weather, there were several reports of grey geese in early *January*. These included a Bean Goose, present at the end of 1972 which remained until the 4th, when 35 Pink-footed Geese flew west and 20 White-fronted Geese fed on the reserve. The following day 4 Whooper and 27 Bewick's Swans passed along the coast.

A party of 25 Golden Plover arrived *February* 17th later increasing to 350.

The first male Black-tailed Godwit appeared *March* 3rd and was joined by a female two days later. Display was taking place by the month end at which time 5 birds were present. The Bittern was first heard booming on 11th and on the same day a pair of Garganey arrived. A male Marsh Harrier arrived on 19th and two days later was carrying nesting material; subsequent breeding did not take place. March 23rd saw the arrival of the first Sandwich Tern, Chiffchaff and Wheatear; also the highlight of the month: a Red Kite. The first Sand Martin came on 24th and next day a Firecrest was located in Walsey Hills. By the month end 4 wintering Ruffs had been joined by at least another 20.

Migrants were slow to arrive in *April*, the first Yellow Wagtail not appearing until 15th and the first Swallow on 16th. Fifty Bramblings were still on Salthouse Heath on 17th and a Great Grey Shrike remained until 22nd. The first Little Tern arrived on 20th on which date an Iceland Gull was observed. On 23rd a party of 14 Ring Ouzels, including 12 males, was in a field near Walsey Hills and a late Hen Harrier was over the Heath. The first House Martin and Sedge Warbler arrived on 27th and Black Tern on 30th.

May started well with Kentish Plover on 1st and a second bird the following day, which was recorded intermittently until 24th. A Temminck's Stint also arrived on 2nd staying nearly two weeks. South-westerly winds predominated from 4th to 13th and many interesting reports were received. On 4th at least 100 Turtle Doves moved west as well as single Marsh and Montagu's Harriers. The first Little Ringed Plover appeared on 5th and next day a male Little Bittern was found in a small reedbed at nearby Kelling. This bird graced the area for four days together with 2 Avocets. New arrivals at Cley on 7th included 2 Spoonbills, 3 Little Gulls and an Osprey. At least 25 Shorelarks were still present on 8th and a single bird lingered until 24th. Fifteen Black Terns passed through on 18th associated with a light easterly wind and in addition to a movement of Swifts and Hirundines, 2 Avocets passed west. May 19th was a red-letter day with Red-throated Pipit, 4 Grey-headed and a Blue-headed Wagtail at Kelling, a second Osprey at Cley and 4 Manx Shearwaters offshore. A Hobby flew west next day. New arrivals on 21st included 5 Avocets and 4 Little Stints while 2 Temminck's Stints were recorded on 27th. The Black-tailed Godwits hatched on 28th and a second pair was observed mating. On

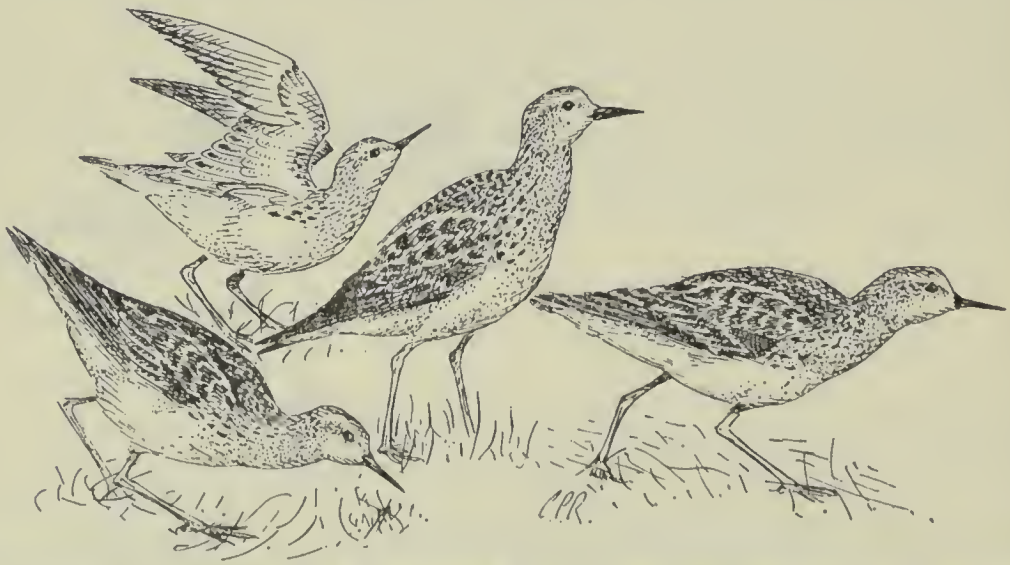


the same day 9 Little Gulls were in the area, representing the highest count of the year. The month ended with two surprises: Broad-billed Sandpiper and Alpine Swift.

Two Avocets which had arrived at the end of May remained until *June* 6th and 1-2 appeared daily from the 24th until early July. 2 Buzzards were soaring over the Heath on 6th, by which time up to 4 Nightjars could be heard churring. Single Marsh Harriers appeared from time to time throughout the month; a Spoonbill was present on 9th/10th and the third Kentish Plover of the spring was reported on 10th and 17th. By the fourth week of June the first "autumn" waders were on the reserve. including 2 Spotted Redshanks and 2 Greenshanks. A Hobby passed through on 27th when a Little Gull was new.

A female Golden Oriole was seen briefly on *July* 1st on wires near Carter's Scrape and 3 young Bitterns were found. Equally surprising was a Tawny Pipit next day. A Honey Buzzard was watched over the Heath on 14th, 2 Manx Shearwaters were offshore and another Little Gull arrived. Single Roseate and Arctic Terns were new on 21st with 3 Little Stints next day. During the next four days waders increased with up to 7 Spotted Redshanks, 14 Ruffs and single Wood and Green Sandpipers. A heavy westerly movement of Bar-tailed Godwits took place on 27th, associated with strong northerly winds.

By early *August* Ruffs had increased to 50 and the first Little Ringed Plover and Curlew-sandpiper of the autumn had arrived. A White-rumped Sandpiper which appeared on 11th for five days was the first of four American waders to turn up this autumn. It favoured the North Pool, but the second of the American quartet, a Pectoral Sandpiper, was discovered on 13th at Salthouse. The first Purple Sandpiper was recorded on 13th and on the following day at least 16 Green Sandpipers were on the reserve. The first "fall" of autumn drift-migrants occurred over the 15th/16th and Blakeney Point held small numbers of Pied Flycatchers, Whinchats, Wheatears and Willow Warblers, as well as a single Icterine Warbler. A Long-tailed Skua flew west on 15th and at least 60 Whimbrel passed through during 17th. A Barred



Buff-breasted Sandpiper at Cley September 1973 (from field sketches by C. Robinson)

Warbler was found by the Beach Road on 18th and the following day an immature Searlet Rosefineh was loeated on the Point. On 24th the first of 2 Spotted Crakes arrived (it was joined by the seeond on 30th). One was subsequently watehed until mid-Oetober. Light easterly winds on 24th/25th resulted in Bluethroat, Ortolan, Ieterine and Barred Warblers reaching the Point. The 26th saw an increase in Little Stints and Greenshank, a Honey Buzzard eame in from the sea and an Osprey passed west. On the same day Quail were reported and 2 Barred Warblers were in Walsey Hills. A further "fall" of drift migrants oceurred on 27th/28th and amongst the birds on the Point were 2 Wryneeks, 2 Ieterine Warblers and single Barred Warbler, Bluethroat and Red-breasted Flyeateher. The fourth Kentish Plover of the year arrived on 30th.

September, as usual, was an exeiting month, eommeneing with the third American visitor: a Buff-breasted Sandpiper. It was present from 1st until 19th and delighted many hundreds of bird-watehers by feeding elose to East Bank during the greater part of its stay. A Dotterel appeared on 4th with 2 next day and an inerease in Curlew-sandpipers on 6th. A few Manx Shearwaters and Great Skuas were reeorded on several dates while strong northerly winds on 10th resulted in a heavy easterly passage of Gannets (300 in a single hour) and Kittiwakes, 7 Puffins and a Sooty Shearwater. In addition 2 Ortolans and a Red-breasted Flyeatcher were on the Point. The following day saw the arrival of the first Snow and Lapland Buntings and another Glaucous Gull. A "fall" on 13th/14th, associated with easterly winds, involved the usual Seandinavian semi-rarities as well as single Richard's Pipit and Long-eared Owl. A Yellow-browed and a Barred Warbler were new arrivals on the Point on 24th when 17 Shorelarks had returned. The September passage of Sooty Shearwaters in 1973 was heavier than usual with 10 on 19th and 21st and 15 on 23rd; while the 30th saw one of the heaviest sea-bird passages recorded on the north Norfolk eoast. The gale-force north-westerly winds, ehoppy seas and spray, however, made identifieation and estimation of numbers extremely difficult. Nevertheless, at least one Great, 10 Manx and 20 Sooty Shearwaters, 150 Gannets and 300 Aretie, 150 Great and 15 Pomarine Skuas were reeorded. In addition, 3 Sabine's Gulls and a Long-tailed Skua passed elose inshore.

A White-winged Black Tern, no doubt a gale vietim, was located on *October* 1st remaining in the area ten days. On the same day an adult Whooper Swan arrived staying until mid-December. Easterly winds during the night of the 3rd resulted in a massive "fall" of Seandinavian thrushes and the following day over 1,000 Robins were estimated to be in the Cley area alone. At least 250 were found on the Point, together with large numbers of Blackbirds and Redwings which eontinued arriving from the sea throughout the day. The Point also held 3 Ring Ouzels, Great Grey Shrike and single Pied and Spotted Flycatehers. A further large movement of Redwings as well as Bramblings oeeurred on 7th and a Red-breasted Flyeateher was found in some bushes on Cley marsh on 9th. Strong north-easterly winds on 11th brought Storm Petrel, 12 Great, a Pomarine and 40 Aretic Skuas. Next day there was a heavy westerly movement of Lapwings and Starlings. A Grey Phalarope, whieh arrived on 13th, remained until early November. The fourth and rarest of the Ameriean waders of the autumn, a Wilson's Phalarope, was identified on Carter's Serape on 21st. The same day saw the start of an unpreeedented passage of Rough-legged Buzzards, with a maximum count of 9 on 26th most of whieh headed west. A pair of Long-tailed Dueks graeed the Sea Pool for several days at the month end, while a late Spoonbill passed west on 27th.

In addition to single Rough-legged Buzzards on several dates, other *November*

raptors included Hen Harrier and Merlin. A Firecrest was found on the Heath on 10th, by which time 2 Great Grey Shrikes had taken up winter quarters. The month ended with 5 Smew, including 2 drakes.

December was generally mild but despite this hundreds of Wigeon were feeding on the reserve. A single Bean Goose, which had arrived in mid-October, remained throughout the month and was joined, for a short spell, by 6 Pink-footed Geese. By the 15th, 250 Snow Buntings were present and the year ended with a count of 109 Pintail on the marsh.

HOLME

During *January* wintering species included 31 Shorelarks, 43 Snow Buntings, 200 Brent Geese, 2-3 Short-eared Owls, 4 Velvet Scoters and 5 Long-tailed Ducks. Hen Harrier appeared on 26th and Bittern on 31st.

A female Blackcap was discovered in the village *February* 4th. Spotted Redshank were observed on a number of dates from 25th until mid-March.

Two Grey Wagtails *March* 3rd heralded the coming spring passage and Blackbirds, Pied Wagtails and 200 Golden Plovers began passing through. 5 Stonechats appeared on 17th and Goldcrests on 20th. Flying west on 22nd, a Little Ringed Plover was spotted. Redwings began moving eastwards, with some apparently reversing the direction of movement, until the end of the month. On 24th 2 Firecrests, 3 Chiffchaffs, White Wagtail and Hen Harrier were all noted. Wheatear arrived on 27th and Black Redstart on 29th.

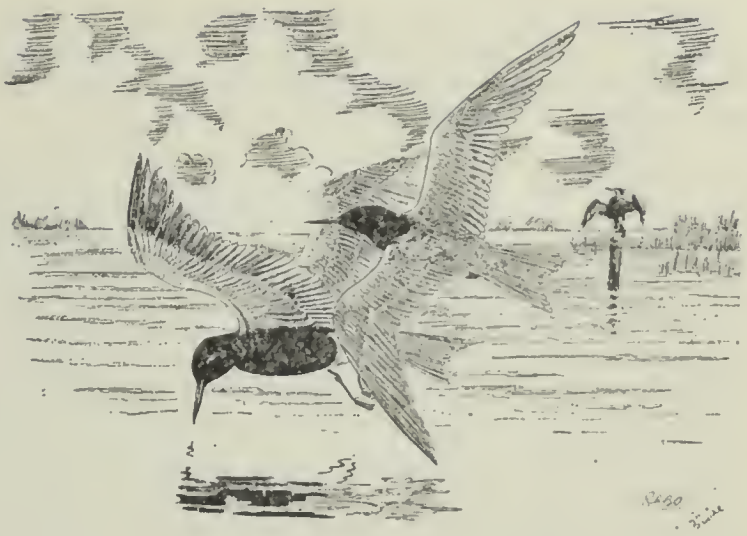
April was very cold and consequently movements were disappointing. Swallow and Wheatear braved the weather on 7th and 2-3 Hen Harriers were seen on several occasions between 7th and 27th. Some wintering birds were in no hurry to depart: Brambling and Rock Pipit lingered until 10th with Merlin on 21st. 7 Black Redstarts appeared on various dates between 10th and 26th. Ring Ouzels were noted between 18th and 30th with a maximum of 8 on 26th. 3 Sandwich Terns were noted on 14th, 3 Sand Martins on 16th and House Martin and 2 Black-tailed Godwits on 17th. A Crossbill stayed 3 days from 18th when Yellow Wagtail arrived. Little Tern and Common Tern on 20th/21st respectively were followed by 2 more Crossbills on 23rd. The 24th brought Greenshank, Whimbrel, Black-tailed Godwits and Cuckoo. The 25th saw the arrival of Sparrowhawk, Sedge and Grasshopper Warblers and Redstart. Lesser Whitethroat, Whinchat, Tree Pipit and 12 Whimbrel were noted on 27th. Marsh Harrier and Reed Warbler arrived on 28th with Wryneck next day.

As if waiting for better weather, Swallows, House Martins and Sand Martins arrived in better numbers up to *May* 15th, with 900 Swallows west on 4th and 250 House Martins and 50 Sand Martins per hour. 6 Swifts flew east on 3rd with 6 Turtle Doves on 4th. Most notable May arrivals were Firecrests on 1st, Black Tern, 2 Avocets and Grey Wagtail on 4th. Dotterel were found on the golf course on 6th and 12th. Osprey and Marsh Harrier appeared on 12th, the latter being noted until 25th. A Red-footed Falcon was watched on 21st. Lesser Grey Shrike added its name to the Bird Observatory's List. Black Tern and late Brambling were present on 27th. Also late Brent Goose and Hooded Crow on 30th.

Ring Ouzels were noted between 1st and 10th, Black Redstarts on 5th with 2 on 6th, one on 7th and 2 again on 16th and another on 19th. Roseate Tern was a good spot on 1st, 50 Yellow Wagtails passed through on 5th with Green Sandpiper on 21st and Nightingale on 27th.

The late Dick Bagnall-Oakeley generously contributed photographs to this Report for well over two decades. His "away from the nest" studies recorded vividly so many exciting events in Norfolk ornithology. Waxwings were certainly one of Dick's favourite subjects.

East Wretham is a Hawfinch stronghold and as many as 45 were present in hornbeams there in early February. The species was also known as an irregular winter visitor by 19th century ornithologists; on occasions large flights of exhausted birds being reported at Yarmouth, particularly during severe weather.



By the beginning of *June* with temperatures in the 70's migration dwindled away. Marsh Harriers were observed on two occasions whilst 2 Avocets appeared on 2nd and 10th. An immature Little Gull on 21st and young Crossbill on 22nd were also notable.

July's best bird was a Red-footed Falcon winging over the marsh on 12th. At sea 12 Great Crested Grebes were in company with 60 Common Scoters on 9th whilst 2 Little Gulls headed west. A Great Skua appeared on 27th. Among the first waders to arrive were 4 Greenshank on 6th with 8 on 30th, Little Ringed Plover on 17th, 160 Sanderling on 22nd, Curlew-Sandpiper on 27th and 3 Little Stints on 30th.

Among more notable *August* sightings were Avocet and 90 Whimbrel west on 10th. Daily passage of Whimbrel was unusually heavy with highest numbers of 300 on 21st and 200 on 23rd. Wood Sandpipers however were scarce with only singles in August and one on 11th October. Little Stint and Curlew-Sandpiper were also scarce and only present in ones and twos. Up to 6 Green Sandpipers were seen most days. Greenshank peaked at 30 birds.

By the 11th passerines were beginning to return and 10 Pied Flycatchers were found. A Black Tern offshore on 5th with Great Skuas and Arctic Skuas made sea-watching interesting. On 13th 5 Black Terns and Little Gull were noted. A Manx Shearwater flew in from the sea passing over the beach on 20th. 3 Long-tailed Ducks were new on 26th with Roseate Tern and 2 Velvet Scoters on 31st. An Osprey headed east on 22nd and Wryneck was present from 26th to 31st. The first Fieldfare arrived on 22nd preceded by Rock Pipit on 16th. During the two-day period 29th/30th 30 Whinchats, 20 Wheatears, 10 Willow Warblers, 6 Pied Flycatchers, 2 Spotted Flycatchers, 6 Garden Warblers, 20 Chiffchaffs and 6 Robins were all counted.

During *September* Wrynecks were noted on five dates. Barred Warblers were also noted singly on 3rd and 10th. Spoonbill appeared on 3rd, 2 Marsh Harriers on 4th (with another on 16th) when the first Snow Bunting appeared. A Red-backed Shrike stayed briefly on 10th and a very late Nightingale was present on 23rd. 4 Brent Geese came on 26th with 6 Bearded Tits next day. During gale-force conditions on 30th many Gannets, Kittiwakes, Great and Arctic Skuas, Pomarine Skua, Little Gull, 2 Sooty Shearwaters and Manx Shearwater battled with rough seas.

The first Redwing arrived on 23rd when the month's sole Ring Ouzel was found. Whinchats, Wheatears, Chiffchaffs, Garden Warblers and Pied Flycatchers were all present in average numbers during the month. Lesser Whitethroats were scarce with only singles; a Grey Wagtail was new on 24th.

October was the most rewarding month of the year, especially after a rather quiet September, and opened with Spotted Crake on 1st and Yellow-legged Herring Gull next day. A Red-breasted Flycatcher and Little Ringed Plover stayed on 4th/5th. On the latter date a Great Grey Shrike and Wryneck appeared. 3 Crossbills and the second Observatory record of a Nuthatch were reported on 11th. Another Great Grey Shrike appeared on 17th. Rough-legged Buzzards became an autumn highlight and ones and twos were present on several occasions from 22nd. A late Spoonbill headed east on 27th. Black Redstarts were regular from 16th until 23rd with a further bird on 28th. Sea-watching continued to be rewarding: north-westerly gales on 21st producing Storm Petrel, Puffin and Great Skuas. Only 3 Shorelarks and 11 Snow Buntings were present during the month. Large numbers of Skylarks headed west on 1st also as many as 50 Rock Pipits per hour. Totals of 20 Dunnocks, 10 Blackcaps, 4 Wheatears, 2 Redstarts, 30 Blackbirds, 50 Song Thrushes, 15 Bearded Tits, 10 Coal Tits, 20 Blue Tits, 10 Great Tits, 20 Chaffinches, 6 Siskins, 4 Redpolls, 4 Bullfinches, Reed and Garden Warblers, Whitethroat, Red-breasted and Spotted Flycatchers and Ring Ouzel were all accounted for during two periods of continuous watching on 4th. Next day another Great Grey Shrike appeared and a Wryneck headed east without staying. 2 Ring Ouzels, 6 Blackcaps, Pied Flycatchers, together with a steady influx of Robins, Thrushes, Tits, Goldcrests and Chaffinches were also noted. Redwings and Starlings, at times in parties of up to 200, continued arriving. 3 Pied Flycatchers and Ring Ouzel were noted on 6th with 20 Blackcaps, 2 Ring Ouzels and Pied Flycatcher next day. The bulk of the movement during the next three weeks was on a similar pattern with Thrushes, Robins and Goldcrests most abundant. Other notable arrivals included single Short-eared Owls and Ring Ouzels until 10th. Up to 10 Blackcaps were seen on many days and Goldcrests reached peaks of 200 between 17th and 22nd. Grey Wagtail and Stonechat were both new on 18th. Fieldfares arrived in a steady flow from mid-month and on 22nd were passing at the rate of 50 per hour. Carrion Crows and Jackdaws passed over on 24th at rates of 20 and 10 per hour respectively. Bewick's Swans, with 25 west on 25th and 16 next day made a welcome sight. A late Swallow was recorded on 27th and a very late Turtle Dove on 30th.

Migratory movements continued during the first half of *November*. On 1st Lapwings and Starlings moved westward at 200 per hour while Fieldfares at 300 per hour were coming south accompanied by Bramblings and Chaffinches. A Pied Flycatcher was very late for this date and 200 Twites arrived. 2 Blackcaps, Ring Ouzel, Lapland Bunting and Short-eared Owl were observed up to 6th. 2 more splendid Rough-legged Buzzards put in an appearance on 3rd remaining to grace the area. 3 Short-eared Owls, 4 Shorelarks, 3 Crossbills, 3 Lapland Buntings, Lesser Spotted Woodpecker (a rare visitor to Holme) and Blackcap all made it a memorable day. 300 Golden Plover arrived by mid-month. 2 Greenshank were notably late on 10th; Shorelarks totalled 16 by 18th. By the month-end Snow Buntings still only numbered 30. Waxwings were observed on only two dates: 2 heading south on 17th and one on 30th. Red-necked Grebes were found on 11th/12th. Twites peaked at 400, a late Great Skua was at sea on 19th and Goosander arrived on 21st.

Highlights for *December* included Hen Harrier, Waxwing on 5th, 6 Short-eared Owls and Blackcap on 10th. A Bittern and 3 Shorelarks were on show on 27th and the year came to a close with the welcome arrival of 250 Snow Buntings.

SNETTISHAM RESERVE
R.S.B.P.
Warden R. Berry

Most exciting visitor at Snettisham during the first part of the year was a Red Kite which remained between *January* 14th and March 1st. Pink-footed Geese reached maximum numbers on 12th when 1816 were at Wolferton. Also in the area were 1800 Shelduck, 6 Shorelarks and 50 Snow Buntings. A Hen Harrier appeared regularly and 3 Goosanders arrived on 11th. Wintering Wildfowl included 256 Scaup at sea, 147 Brent Geese, 2-300 Common Scoters, 32 Eiders, 3 Whooper Swans (which departed February 22nd), 40 Goldeneye, 60 Pochard and 50 Tufted Duck. 2 Purple Sandpipers were noted on two occasions.

At sea off Snettisham on *February* 17th were 36 Velvet Scoters, 139 Common Scoters, 190 Scaup and 47 Eiders. 982 Pink-footed Geese were at Wolferton, while 17 Red-breasted Mergansers and 42 Goldeneye were on the Reserve. Among 893 Pink-footed Geese on 25th were 3 Bean Geese and a Barnacle. 8 Shorelarks and 60 Snow Buntings spent the first half of the month at Snettisham.

March birds of prey included male Hen Harrier, Sparrowhawk and, on 18th, 2 Rough-legged Buzzards. 167 Pink-footed Geese remained at Wolferton on 12th; also the 3 Beans and single Barnacle. 79 Bewick's Swans passed through on 19th. Off Wolferton on 19th were 144 Eiders, 136 Common Scoters, 82 Scaup, 8 Velvet Scoters and 102 Great Crested Grebes; in addition 62 Velvet Scoters were off Snettisham. Migrants on 26th included Black Redstart, Grey Wagtail, Wheatear and Chiffchaff. The last 22 Pink-feet left on 27th when 4 Purple Sandpipers and a Bittern were noted.

A flock of 57 Velvet Scoters remained on *April* 11th when Black Redstart and Greenshank were new. The 19th was interesting with Great Skua while Ring Ouzels appeared on 24th/25th.

Two late Purple Sandpipers were observed *May* 2nd followed by a Black Tern next day. Two Montagu's Harriers and Little Gull passed through on 9th, Little Ringed Plover on 11th, 12 Black Terns and male Red-footed Falcon on 19th, Osprey on 22nd/23rd and 2 Marsh Harriers on 27th. During the first three weeks up to 40 Little Terns roosted on the beach; one pair remained to breed—the first for 10 years, but was flooded out. By the end of May 48 pairs of Common Terns were breeding, a record number; 60 young reached the flying stage.

The first week of *June* saw Sanderling reaching a spring peak of 632 birds. A female Marsh Harrier was regularly noted until the 9th; also 3 Black Terns and a single Red-breasted Merganser. 18 pairs of Ringed Plovers bred on the Reserve rearing 20 young (total number of pairs between Heacham and King's Lynn was 31). Also nesting on Wolferton saltings were 2 pairs of Common Terns and 3 pairs of Oystercatchers (a total of 14 pairs of Oystercatchers bred between Heacham and King's Lynn).

Over 1500 Shelduck had assembled off Wolferton by early *July* and moult migrants began departing on 14th with groups of between 50 and 70 leaving each evening until 27th. Between 28th and 31st 25 Greenshank, 20 Common Sandpipers and 2 Curlew-Sandpipers roosted on the Reserve. Also present were Flamingo and Marsh Harrier.

At high water, roosting birds during early *August* included 3 Curlew-Sandpipers, Little Ringed Plover, 16 Greenshank, 40 Little Terns and 70 Sandwich

Terns. 9 Green Sandpipers and 22 Greenshank appeared on 12th. Between 2,000 and 3,000 Swifts were feeding on flying ants rising from the beach on 13th. The first 2 Arctic Skuas arrived on 16th. At the month end interesting birds included 16 Whinchats, 3 Little Stints and 27 Greenshank.

A Spoonbill made *September* 7th notable, followed by 4 Marsh Harriers on 12th, 27 Greenshank and 28 Curlew-Sandpipers on 16th, 2 Fieldfares and 4 Little Stints on 17th, Black Tern on 23rd and 3 Spotted Redshank on 26th. Gales on 30th brought 100 Gannets, 140 Arctic Skuas, 26 Great Skuas and 12 Manx Shearwaters into The Wash at Wolferton.

Little Gull and Redwing were noted *October* 1st, with Sparrowhawk, 15 Greenshank and 48 Little Grebes on 12th and 8 Bewick's Swans on 14th. 98 Pink-footed Geese had returned to Wolferton on 19th when Great Grey Shrike and Stonechat were on the Reserve; also 3 Shorelarks and Black Redstart. A Waxwing was noted on 20th and Rough-legged Buzzard on 23rd. Crows were a feature with a peak on 28th when 120 Carrion, 11 Hooded, 22 Rooks and 33 Jackdaws came through; 7 Bewick's Swans appeared, also 8 Short-eared Owls, a late Wheatear and 2 Kingfishers.

The first week of *November* brought 2 female Hen Harriers and 7 Bewick's Swans. By mid month 70 Little Grebes, 50 Pochard, 40 Tufted, 20 Goldeneye and several Red-breasted Mergansers were on the Reserve. 4 Goosanders were new on 14th, 400 Pink-footed Gecse at Wolferton on 20th, 9 Whooper Swans on 22nd and 2 Stonechats on 25th. Pink-footed Geese had increased to 726 by 27th, together with 13 Red-breasted Mergansers. A further 12 Bewick's Swans passed through on 29th and the month ended with a Red-necked Grebe at Wolferton.

Wildfowl at the beginning of *December* included 2 drake Goosanders, 36 Bewick's Swans, 56 Brent Geese and Long-tailed Duck (which remained till the end of the year). A further 46 Bewick's Swans came in on 3rd; also a Flamingo which stayed until the New Year. Over 1,000 Pink-footed Geese were present by 4th and a total of 26 Bewick's Swans passed through between 4th and 15th; also 2 more Long-tailed Ducks. From 15th onwards between 25 and 30 Red-breasted Mergansers were a feature; also 2 Hen Harriers. 11 more Bewick's Swans and a Great Grey Shrike appeared on 20th and at the month end 1158 Pink-footed Geese were at Wolferton.

TITCHWELL NATURE RESERVE (N.O.A.)
TITCHWELL MARSHES (R.S.P.B.)

A Hen Harrier wintered in the area remaining until *April* 18th. April passage migrants included single Black Redstarts on 10th and 22nd, Swallow and Willow Warbler on 18th, 2 Ring Ouzels and Yellow Wagtail on 23rd, Cuckoo on 24th, Blackcap, Sedge and Reed Warblers all on 27th and Turtle Dove on 28th.

Over 100 Golden Plovers remained *May* 1st when large numbers of Swallows moving west with the first House Martins. Common Sandpiper, White Wagtail, 2 Marsh Harriers, Firecrest and Lesser Whitethroat all arrived on 8th. Other Marsh Harriers passed through on 10th, 12th, 13th and 20th (the first appeared April 25th). Spotted Flycatcher was new on 12th with 2 Dottcrel on 20th, Black Redstart on 27th and Little Ringed Plover on 30th.

Among *July* birds of note were Marsh Harrier and the first "autumn" Pied Flycatcher on 26th. A Swallow roost of up to 3,000 birds lasted from mid-*August* until early September. Greenshank peaked at 18 in mid-*September*, Yellow-browed

Warbler was ringed on 24th and Arctic Warbler next day. Neither of these rarities was observed before or after netting.

A Red-breasted Flycatcher was present *October* 4th and Shorelarks arrived on 14th (increasing to 30 by late December). Large numbers of Blackbirds, Redwings and Fieldfares arrived on 22nd with the first Hooded Crow on 24th. Over 60 Bearded Tits were present in *November* when a Hen Harrier returned, followed by 2 Rough-legged Buzzards on 25th. At this time wintering flocks of 100 Twites, 25 Corn Buntings and 20 Snow Buntings were on show.

WAXHAM

D. J. Frost and E. L. Williams

Highlight of the year at Waxham was a male Sardinian Warbler trapped April 28th and seen by a number of observers the following day. This is the first county record. Other interesting species recorded in spring included Long-tailed Duck, Shorelark and Sparrowhawk.

Although few birds were trapped on spring passage good numbers were handled during the autumn, among them 2 Firecrests and an immature Great Grey Shrike the same day. Notable autumn species included 2 Rough-legged Buzzards, Marsh Harrier, Wryneck, Black Redstart and Jack Snipe.

Ringing records reveal some marked changes compared with 1972 results with a general decrease in the number of warblers and chats, though Whitethroats surprisingly showed an encouraging increase. Most notable was an increase in the number of tits ringed, especially Long-tailed Tits with 135 ringed compared with none the previous year. A similar situation was recorded at most British observatories.

Interesting foreign recoveries of Waxham ringed birds included a Redwing caught in the autumn 1972 and found dead on Heligoland in September 1973. A Song Thrush ringed at the same time was caught and caged in Southern Spain and finally a Reed Warbler caught this September was found dead 16 days later near Lisbon, Portugal.

966 birds of 43 species were handled in 1973. The ringing totals included 3 Kingfishers, 24 Swallows, 3 Whinchats, 26 Great Tits, 103 Blue Tits, 2 Willow Tits, 135 Long-tailed Tits, 99 Blackbirds, 40 Hedge Sparrows, 74 Robins, Sardinian Warbler, 15 Garden Warblers, 26 Blackcaps, 14 Whitethroats, 7 Lesser Whitethroats, 13 Redstarts, 6 Spotted and 7 Pied Flycatchers, 81 Goldcrests, 2 Firecrests, Great Grey Shrike, 49 Wrens, 15 Goldfinches, 17 Bullfinches, 35 Yellowhammers, 34 Reed Buntings and 26 Tree Sparrows.

WELNEY WILDFOWL REFUGE

The Refuge held considerable numbers of ducks during both winters but mild weather probably kept the totals for some species down. Wigeon reached a peak of 25,000 in mid-January, dropped suddenly to 12,000 in early February but climbed again to 17,000 on 17th before a rapid departure in March. Mallard fluctuated between 800 and 1500 while both Pintail and Shoveler topped 300. Pochard reached a peak of 200 in February.

As usual it was the swans that provided the greatest spectacle with 600 Bewick's in late January, together with up to 23 Whoopers and just over 100 Mutes. The

Bewick's stayed in good numbers through February and early March before departing in the middle of the month. Unusual visitors included a Smew, present for most of January, a Hen Harrier in February and up to 60 wintering Ruffs. 16 White-fronted Geese were observed in January and February.

The breeding season started very early with the first Mallard nest found February 17th. First broods mostly perished in the cold weather that followed, but later hatchings were more successful with at least 7 broods of Tufted Ducks, while Shoveler and Shelduck also bred well. 4 pairs of Black-tailed Godwits bred successfully, after one early clutch had been taken by Jackdaws. Ruffs were not proved to breed but a lek was established at the end of March and it is thought that as many as 4 pairs may have bred. A pair of Black Terns stayed a while, but did not nest. A Hoopoe put in an appearance May 18th and a Spoonbill the following day.

During September Mallard built up rapidly to a peak of 3,000 and after a fall in November reached this level again in December. Wigeon increased steadily through the autumn to about 18,000 at the year end. Shovelers were especially numerous in September and October with a peak of 600, but these had mostly left by December. The first Bewick's Swans arrived in mid-October and there were 800 feeding on the lagoon by the end of the year. Whooper Swans totalled 30. A single Smew was present from mid-November onwards, while a Bittern was frequently seen in the second half of October.

WINTERTON DUNES

J. G. Goldsmith

Observations and a ringing programme were again carried out at Winterton. Unlike 1972 however, when observations did not start until September, most of the year was covered with visual observations and ringing was carried out on 26 different days. 1973 spring migration at Winterton was, in common with other British Bird Observatories, rather poor and only 107 birds were ringed during this period. The autumn too, did not compare with the previous year and only 603 birds were ringed. 710 birds of 52 species were ringed in 1973, making a total of 1,384 birds of 58 different species in two years. Only on a single day were treble figures obtained: October 6th with 123 ringed.

Recoveries of ringed birds are now beginning to come in. Most interesting was a Song Thrush, ringed in France and controlled at Winterton in the autumn; the same day 2 Long-tailed tits were ringed which moved 211 miles south-west in 15 days, constituting the longest movement recorded so far in Britain.

143 species were recorded on the reserve during the year, including 2 Bee-eaters, Tawny Pipit and an impressive Rough-legged Buzzard passage.

The first date any time was spent at Winterton was April 29th when a Cuckoo was calling as were 3 Grasshopper, Sedge and several Willow Warblers. A Swallow flew through the reserve, but the only migrants caught were 2 each of Goldcrest and Willow Warbler.

Four Little Terns had returned on May 3rd and a few Willow and Garden Warblers were present. A pair of Stonechats had taken up territory, and House Martin arrived off the sea. Best bird of the day was a Ring-tail Hen Harrier. May 7th produced Reed Warblers, Whitethroat, Blackcap and Chiffchaff, a female Marsh Harrier was new. The 12th brought Turtle Doves, Swifts, Redstart and Whinchat.

Autumn wader passage was in full swing by August 18th and a dozen Snipe, 3 Green and Common Sandpiper were seen with Little Ringed Plover and several

Dunlin. On 25th a very early Redwing was noted, together with 5 Wheatears and 1 - 2 Whinchats. Four Gannets were at Sea. Best birds of the day were 2 Bee-eaters flying north over the reserve. By 27th numbers of Pied Flycatchers had arrived and 7 were ringed during the day; very few appeared in September. Wheatears, Redstart, Whinchat and Lesser Whitethroat were found as well as Whimbrel.

By September 1st things were unusually quiet—the only true migrant ringed was a Garden Warbler. On 9th plenty of Meadow Pipits and Reed Buntings were present; one of the latter was controlled in Devon two months later. The 15th/16th were similar with unprecedented numbers of Long-tailed Tits. A female Marsh Harrier was seen twice during 15th. The following day a juvenile Great Skua flew inland mobbed by Swallows; a Wryneck was ringed.

The 23rd was surprisingly poor for netting and no chats or flycatchers were present. Waders included Spotted Redshank, Greenshank, four Sanderling, five Knot, Little Stint, 15 Dunlin and 2 Curlew Sandpipers. At sea were Wigeon, Cormorant and Arctic Skuas. Raptors included Hen and Marsh Harrier, Kestrels and Hobby. Long-tailed Tits were still plentiful and at least 15 Wheatears were observed. A Turtle Dove was seen on 25th, but only 14 birds were caught for ringing.

October is traditionally good at Winterton and 55per cent of the birds ringed were caught that month. Long-tailed Tits were numerous during the first week. On 2nd a big flock of Tree Sparrows came off the sea, Golderests were increasing and an Arctic Skua flew by; 4 Bearded Tits, Turtle Dove, Little Stint, and 2 Hen Harriers were also seen. The only real "fall" of the autumn was on 6th/7th when 184 birds were ringed including 46 Robins. Long-tailed Tits and Goldcrests were numerous as were Reed Buntings and Redpolls, although only a small proportion were "Mealy" in character. Two Hen Harriers, Great Grey Shrike and Black Redstart were all new on 6th, while 7th produced a Hen Harrier, at least 2 Great Grey Shrikes, Whinchat, "Northern" Chiffchaff (which was ringed) and a French-ringed Song Thrush (which was controlled).

The 14th was disappointing for catching but a few tired Blackbirds came in off the sea all morning. By the 27th/28th movement was declining amongst the passerines, although 16 Chaffinches were captured on the latter date. During the week end at least three Rough-legged Buzzards were sighted as were single Hen Harrier and Great Grey Shrike. Five Bewick's Swans passed through.

The weather maps were watched carefully at this time for south-easterly winds to bring Firecrests. A first-light visit on 1st Nov. showed at least five Firecrests behind the dunes and near the "tank-traps". Three were caught and ringed, all weighing just 5gms. A Rough-legged Buzzard was the only other notable bird. Another Firecrest was ringed on 4th which produced a most interesting day's watching: Blackbirds were numerous and a number of Bramblings, Redpolls, Siskins and 2 Collared Doves were present. 350 Golden Plovers were on the fields and a late Turtle Dove sped southwards. Raptors included Kestrel, Sparrowhawk, 2 Hen Harriers and 4 Rough-legged Buzzards. Best bird of the day was a Tawny Pipit in the sand dunes making an excellent end to a most interesting year's observations.

The year's ringing total included 9 Dunlin, Kingfisher, Great Spotted Woodpecker, Wryncck, 15 Swallows, 16 Great Tits, 57 Blue Tits, 9 Willow Tits, 73 Long-tailed Tits, 20 Wrens, 9 Treecreepers, 11 Redwing, 29 Blackbirds, 74 Robins, Grasshopper Warbler, 17 Blackcaps, 3 Whitethroats, 6 Lesser Whitethroats, 41 Goldcrests, 4 Firecrests, 11 Pied Flycatchers, 31 Redpolls, 21 Bullfinches, 23 Chaffinches, 22 Yellowhammers, 57 Reed Buntings and 16 Tree Sparrows.

Short-eared Owls and their prey

John Buckley

SHORT-EARED Owls wintering in Norfolk are present from late October to the end of March; most birds being recorded during the months of December, January and February. (*Norfolk Bird and Mammal Report* 1967-71).

The main wintering areas are the lower reaches of the Bure, Yare, and especially the grazing levels near Breydon, the arable farmland of N.W. Norfolk near Docking and to a lesser extent, the salt marshes of North Norfolk. Short-eared owls do breed in Norfolk, but only in small numbers, the annual number of recorded nests varies between 0 - 5.

The number of wintering owls or the number of breeding pairs might be expected to fluctuate in relation to the prey species population cycle, but the Norfolk records show no regular pattern.

Methods

To determine the prey of wintering owls, collections of regurgitated pellets were made from a communal roost at Summerfield near Docking, and from roosts in East Norfolk; Hardley near Loddon, Haddiscoe Island and Halvergate Marshes near Breydon Water.

The pellets were analysed by carefully pulling them apart and identifying the skulls found amongst the matted fur and feathers of the prey. The results are given in the table. The number of skulls of each prey species, found in the pellets, is shown, together with the percentage each species forms of the prey, and the percentage each species contributes to the diet of the owl. To estimate the contribution of each species to the diet the number of skulls of each species is multiplied by a conversion factor which is based upon the average weight of the prey species. (*Southern* 1954).

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Opposite page :

Henry Stevenson's Birds of Norfolk (1870) contains much detail regarding local heronries; at that time only eight heronries were in occupation in the county and of these all but two: Kimberley and Didlington have since fallen into disuse. Didlington, dating to the beginning of the 19th century contained 60 to 65 nests a century ago. Earlham Park heronry (finally deserted in 1928) held between 80 and 100 nests in the 1850's but following a severe gale in 1860 the majority of the birds moved to Costessey where 60 nests were built in 1866. The Didlington herons provided "sport" for a thriving falconry club until the 1830's. A Heron taken by a falcon near Hockwold was found to be carrying a thin copper plate attached to the leg indicating it had been caught at the same locality 15 years previously.

Results

Glue (1970) observed that the diet of Short-eared Owls in Britain is dominated by Brown Rats, Field Voles or birds. The Norfolk pellet analyses reveal diets of the first two types. The Summerfield owls fed mainly upon the Brown Rat *Rattus Norvegicus* and the East Norfolk owls took mainly Field Voles *Microtus agrestis*.

The Summerfield owls hunt a locality where most of the land is used for arable farming and it is not surprising that Rats form the bulk of the prey. It is interesting that the percentage of Brown Rat in the diet decreases from January to March and other species, notably the Wood Mouse and birds become more important. Vernon (1972) noticed that at Fulbourne Fen, Cambs., the percentage of Brown Rat in the diet of the Short-eared Owls decreased throughout the winter and also that Wood Mice and birds became more important in the Owl's diet.

The Short-eared Owls at East Norfolk roosts hunt low lying grazing meadows and, as was observed with Barn Owls in these localities the Field Vole forms the bulk of the diet. (Buckley & Goldsmith 1971). This is because the Field Vole is a species which abounds in open rough grassland. The results of pellet analysis show that the Short-eared Owl takes fewer prey species than the Barn Owl, it tends to specialise on one small mammal species and birds at each site. Other prey species are probably taken when the vulnerability of the main prey species, to predation, becomes less.

Summary

Short-eared Owl pellets were analysed from four communal roosts in Norfolk. The Brown Rat was the main prey species in an area of arable farmland. The percentage of this species decreased during the period January to March, as Wood Mice and birds became more important in the diet. At the three other sites the owls hunted over grazed meadowland and the Field Vole was the main prey species forming over 70 percent of the prey.

(See table on p.88)

Acknowledgements

I am grateful to the late R. P. Bagnall-Oakeley for collecting the Summerfield pellets and to J. G. Goldsmith for collecting and analysing some of the East Norfolk pellets.

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Opposite page:

A company of 60 Black-tailed Godwits assembled at Vinegar Middle in The Wash March 24th. The first birds had returned to the Ouse Washes (Cambs/Norfolk) March 5th and some 55 pairs reared over 100 young. Early autumn peak at Wisbech sewage farm was 155 on July 15th. Very occasionally odd Black-tailed Godwits visit Norfolk in mid-winter.

The prey taken by Short-eared Owls wintering in Norfolk

(See article; p.86*)*

	Summerfield **2 Jan 1967** 28 pellets			Summerfield **14 Jan 1967** 70 pellets			Summerfield **1 Feb 1967** 75 pellets			Summerfield **24 Mar 1967** 90 pellets		
	NO.	%	PU%	NO.	%	PU%	NO.	%	PU%	NO.	%	PU%
Mole												
Common Shrew							1	1.5	0.2	1	1.6	0.3
Bank Vole							1	1.5	0.4	1	1.6	0.6
Field Vole				2	4.4	1.2				2	3.2	1.3
Wood Mouse				5	11.1	3.1	16	24.8	7.3	21	33.3	14.0
Brown Rat	16	80	95.2	29	64.4	90.1	37	57.7	84.8	22	34.9	73.2
Bird	4	20	4.8	9	20.0	5.5	9	14.5	7.3	16	25.4	10.6

	Haddiscoe **2 Feb 1970** 115 pellets			Hardley **2 Feb 1970** 64 pellets			Hardley **28 Mar 1970** 128 pellets			Halvergate **19 Feb 1973** 70 pellets		
	NO.	%	PU%	NO.	%	PU%	NO.	%	PU%	NO.	%	PU%
Mole							1	0.4	1.9			
Common Shrew										2	1.7	0.8
Bank Vole	1	0.3	0.3				1	0.4	0.4			
Field Vole	304	94.1	90.8	118	79.7	73.7	231	90.3	86.2	117	98.3	99.2
Wood Mouse	1	0.3	0.3	9	6.1	5.6	4	1.6	1.5			
Brown Rat				3	2.0	9.4	2	0.8	3.7			
Bird	17	5.3	8.6	18	12.2	11.3	17	6.6	6.3			

Great Crested Grebe census

A census was carried out early in June giving a county total of 498 adults. Details appear below; for the sake of completeness counts relating to the Lothingland district of north-east Suffolk are also given (but excluded from the Norfolk total). It is interesting to note that as long ago as 1890 Thomas Southwell claimed Lothingland as belonging, for ornithological purposes, to Norfolk! (*Birds of Norfolk* III: 171):

Broads: Rollesby 13 adults, Filby 4, Ormesby 16, Lady 2, Hickling 10, Heigham Sounds 10, Horsey 4, Rockland 10, Surlingham 2, Martham 4, Barton 19, South Walsham 7, Salhouse 12, Hoveton Great 30, Black Horse 20, Wroxham 18, Hardley Flood 6, Alderfen 2, Belaugh 0, Burnt Fen 2, Ranworth Inner 12, Upton 1, Woodbastwick Decoy 6, Woodbastwick Old Hall 2, Malthouse 2, Whiteslea 2, Hudson Bay 2 and Sutton 2.

River Yare between Whitlingham and Reedham, a distance of 16 miles: 26 adults as follows:

Whitlingham to Coldham Hall 9
Coldham Hall to Buckenham Ferry 7
Buckenham Ferry to Reedham 10.
Breydon Water (Berney end) 21 adults

River Bure between Yarmouth and Wroxham Bridge, a distance of 24 miles: 13 adults as follows:

Yarmouth to Acle Bridge 0
Acle Bridge to Thurne Mouth 1
Thurne Mouth to Ranworth Dyke 2
Ranworth Dyke to Salhouse Broad 3
Salhouse Broad to Wroxham Broad 2
and Wroxham Broad to Wroxham Bridge 5
River Ant (Ant Mouth to Irstead Shoals) 3
Stalham Dyke 2

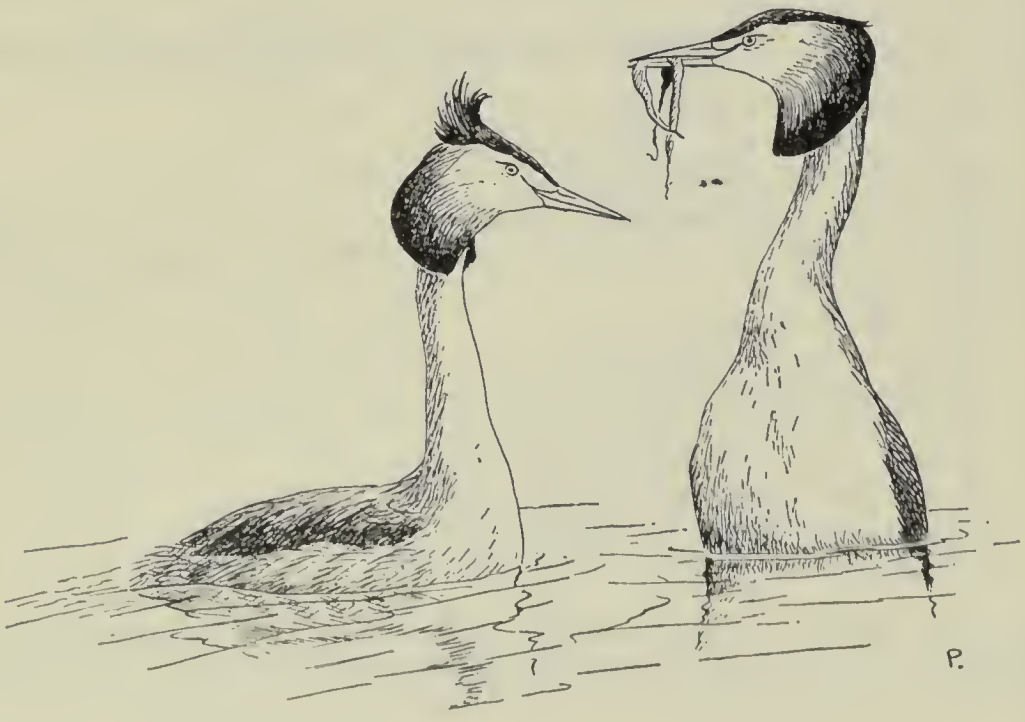
Lakes and Gravel Pits: Weybread G.P. 10, Hainford G.P. 0, Sparham G.P. 6, Lenwade G.P. 12, Felbrigg Lake 0, Lyng/Fustyweed/Elsing G.P. 6, North Shropham G.P. 5, Swanton Morley G.P. 8, North Elmham Lake 0, Seamere 16, Snetterton

G.P. 9, Taverham Corporation/Costessey G.P. 8, Haveringland Lake 0, Blickling Lake 4, Cawston Manor Lakes 0, Gunton Park Lakes 3 ,Holkham Lake 0, Earsham G.P. 2, Melton Constable Lake 6, Wortwell G.P. 2, Reymerston G.P. 0, Pentney G.P. 2, Beeston St. Lawrence Lake 0, Homersfield G.P. 2, Blackboro' End/East Winch/Foster's End G.P. 2, Ditchingham G.P. 0, Bawburgh/Colney G.P. 4, Wolterton Lake 2, Worthing G.P.2, Broom Heath G.P. 4, Middleton G.P.2, Stowbridge/Runcton Holme G.P. 4 and Tottenhill G.P. 1.

Brecks: Stradsett Lake 2, Narborough G.P. 4, Narford Lake 6, Thompson Water 0, Shadwell 0, Lang Mere 0, Saham Toney Mere 4, Stanford Water 1, Scoulton Mere 2, Mickle Mere 4, West Acre G.P. 0, Didlington 0, Fowl Mere 0 and Tottington 0.

Fens: Great Ouse between Ship Inn (Brandon Creek) and Denver 14. Relief Channel between Denver and King's Lynn 32, Cut-off Channel between Feltwell and Denver, 22 adults as follows: Feltwell Black Dyke 2, Feltwell Fen 2, Feltwell Southery Road 2, Stoke Ferry 4, Wretton 2, Wissington Road, 2, Hilgay Pit 2, Methwold Hythe 2, Methwold Thornham 2 and Middle Level Main Drain 2, Welney No. 1 Pit 2, Welney No. 2 Pit 1 and Wissington Pits 4. Lothingland: Fritton Lake 12, Lound Waterworks 6, Flixton Decoy 6 and Blundeston Lake 2.

During the previous two decades counts of Norfolk Great Crested Grebes were made in 1954 (342 adults), 1961 (481 adults) and 1965 (365 adults). The only earlier census (carried out in 1931) gave a total of 420 adults (made up of 201 breeding pairs and 18 non-breeders). It should however be borne in mind that previous counts have almost entirely neglected the Great Ouse basin. Extensive new drainage schemes here in recent years have created new grebe habitats. The Cut-Off Channel (completed in 1964) runs a distance of 27 miles round the edge of the Fens from the river Lark at Barton Mills to Denver Sluice. The Relief Channel runs from Denver to the outskirts of King's Lynn.



A dramatic decline in numbers has taken place on the Flegg Broads. On 17th April 1937 for example Ormesby alone had 26 *pairs*. As recently as 1961 the total for Filby, Rollesby, Lady and Ormesby Broads was 125 adults, compared with only 33 in 1973. Fritton Lake, too, has declined as a haunt of Great Crested Grebes with only 12 adults in 1973. This Suffolk stronghold contained 56 adults in 1931 and 40 in 1960 and in 1965 (W. H. Payn's *Birds of Suffolk*).

The Breck population was disappointingly low and no young were reported. At Mickle Mere many fish and eels had died in 1972 so presumably the feeding remained poor for grebes in 1973 (the high total of 23 Great Crested Grebes was found here on 7th March 1971). Rush Mere had all its phragmites cleared making it unsuitable for nesting; Tottington and Thompson were both very low and Lang Mere dry. Didlington has become too shallow.

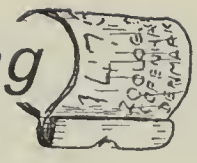
At Breydon Water non-breeding grebes began summering in 1968, particularly at the Berney Arms end of the estuary. In 1973, 28 were present in late March and between 16 and 24 until the end of July. For the first time birds remained here until the end of the year with 13 in December.

During August the majority of Great Crested Grebes depart from breeding waters (at Swanton Morley G.P. however 2 juveniles remained to the end of the year). Family parties reach The Wash by mid-month and peak numbers are reached in November/December. Recent counts have not exceeded 40 to 60 birds, but until 1961 up to 250 spent short winter days in the channels between Snettisham and Hunstanton. In the main the birds scatter, ebbing and flowing with the tide, but occasionally they come together in compact groups especially near the end of their stay. On 14th March 1971 for instance 27 assembled off Hunstanton whilst on 19th March 1973 an unprecedented total of 102 was found off Wolferton. Some linger on The Wash until late spring; 6 remained off Bull Dog Sand on 21st April 1973, whilst 10 were still present at Hunstanton on 22nd May 1969. Also, near the end of the stay nuptial plumage is assumed and display between pairs takes place; this includes penguin dance, head twisting and neck shaking.

The decline in The Wash grebe population could be partly explained by the creation of Grafham Water in Hunts. Largest lake in the south of England and 1570 acres in extent, it was full early in 1966. Great Crested Grebes winter annually with a maximum of 105 in 1970/1 (*Cambridge Bird Club Report* 1972).

Clearly neither The Wash nor Grafham Water winter observations account for the whole of the population summering in Norfolk. The answer may well be the giant Essex and London Area reservoirs. At Abberton alone 500 had assembled on 17th September 1971 and as many as 551 on 18th October 1970 (*Essex Bird Reports*). Staines attracted 135 by the end of August 1972 increasing to 180 the following month. In the early autumn of 1973 Staines held 250 on 4th August. The same year King George VI had 221 by 28th August and this gathering remained until early October with 225 on 7th October—by the month-end only 62 remained. High numbers elsewhere in the London Area in 1973 included 174 at Wraysbury in mid-September when 150 at Queen Mary and 112 at Walton and Queen Elizabeth II (*L.N.H.S. Bulletins*)

Acknowledgements: Observers' names appear on page 110. Particular thanks are due to R. Powley and G.M.S. Easy (Great Ouse, Relief Channel and Cut-Off Channel), C. A. E. Kirtland and A. E. Vine (Brecks), H. Dolman (Bure Valley Reserves) and M. Jenner (extensive coverage along the Yare, Bure, Thurne and Ant).

Bird Ringing  Report

The style first adopted in the 1969 Report has been continued. Recoveries extend to eleven European countries (including Russia in Europe), and also to Iceland, Greenland, Canada, Morocco, Mauritania and South Africa. Two species call for special attention: Cetti's Warbler from Belgium (the first county occurrence) and Knot from Ellesmere Island (Canada) north of Baffin Bay where the ring was found in a Gyr Falcon pellet. The *Wash Wader Ringing Group* have again supplied many details.

Fulmar

Fair Isle, Shetland 2.9.69	Mundesley (dead, fish hook through wing) 25.4.73

Heron

No very distant recoveries reported, although individuals did reach Yorks, Bucks (2), and Oxon. Some are apparently shot, including locally.

Mallard

Recoveries followed the usual pattern: autumn or winter-ringed in Norfolk: summer reports from Scandinavia.

Teal

One from Dersingham was shot in Denmark, and birds from Netherlands and Essex were shot at Salthouse and near King's Lynn respectively.

Wigeon

Three recoveries come from Russia, two during the breeding season. Others were shot in Salop, Lancs, Essex (2) and in France and Netherlands, the last two being useful additions to the list of Wigeon moving south-east to the Continent between December and February, a movement not yet satisfactorily explained. All were shot.

Snettisham 10.2.70	Ust-Kulom, Komi A.S.S.R. 20.2.72
Snettisham 19.2.73	Nar'yan Mar, Archangelsk, U.S.S.R. 24.5.73
Snettisham 19.2.73	Ust-Tsil'ma, Komi A.S.S.R. 20.5.73
Snettisham 26.1.72	Challerange, Ardennes, France 16.12.73
Snettisham 8.12.72	Staphorst, Overijssel, Netherlands 15.12.73

Shoveler

Eilandspolder, Netherlands (pullus) 11.6.70	Irstead (killed) 11.12.71
Werken, W.Flanders, Belgium (pullus) 25.6.71	Norwich (killed) 18.9.71

Pochard

It is possible that this bird was reared in the Leningrad area.

Zagub'ye, Leningrad, U.S.S.R. 17.8.71	Snettisham (found dead) 2.1.73

Moorhen

Kogleaksso, Jutland, Denmark (pullus) 25.7.71	Hickling (traffic casualty) 3.1.73

Oystercatcher

Eighteen recoveries in Norway, and a scattering of others from nearer parts of Europe have been reported; also single birds found on the breeding grounds in Shetland and the Faeroe Islands.

Turnstone

A bird from Snettisham, 26.8.72 was found dead in May 1973 on the Humber Estuary, Lincs. The other report is of one reaching the most northerly land mass in the world.

The Wash 5.8.67	Pearyland, N.E. Greenland (killed) 4.7.73

Redshank

The following recovery adds to the list of birds of Icelandic origin (see Norfolk B.R. 1972)

Wolferton (1st year) 31.8.72	Tjarnir, Iceland (dead) 17.6.73

Knot

Systematic ringing of the species on the Wash has again resulted in reports from Denmark, Germany, Netherlands and France. Fifteen controlled on Vlieland and at Schiermonnikoog were part of the first major catches of the species to be made in the Netherlands. Other recoveries came from further north during the breeding and late summer.

The Wash 7.3.70	Hafnorfjordur, Iceland (dead) 8.8.73
The Wash 25.2.71	near Julianhaab, Greenland (killed) 28.7.73
The Wash 19.2.72	N. Atlantic Ocean, off S.E. Greenland 5.8.73
N. Wootton 27.8.68	Eureka, Ellesmere Is., Canada (ring in Gyr Falcon pellet) Summer 1973
Wolferton 5.5.69	Jameson Land, E. Greenland (killed) 30.6.73

Dunlin

Recoveries followed the usual pattern, with two moving to Africa. and others to various parts of the British Isles and Europe.

N. Wootton 4.8.73	Banc d'Arguin, Mauritania 24.10.73
Terrington 28.8.72	Casablanca, Morocco 14.4.73

Herring Gull

Nigg, Ross-shire (adult) 2.8.68	Snettisham (dead) 29.10.73
Isle of May 9.7.66	Titchwell (ring found on beach) 22.6.73

Common Gull

Winter ringing of this species suggests that our population comes from Norway or Finland. Note the age of this individual.

Holme 15.1.63	Greaker, Ostfold, Norway (hit wires) 19.5.73

Black-headed Gull

As recoveries accumulate, there is little to suggest that any of our winter population in Norfolk is of native stock. Birds ringed here in winter went to Sweden (3), Finland, Netherlands, Germany during Summer and Autumn. A Norwich ringed bird, Jan. 1966, was dead at Rackheath, Jan. 1973. The other recovery reported was a Dutch immigrant:

Hilversum, N. Holland, Netherlands 18.6.73	King's Lynn (dead) 20.8.73

Woodpigeon

The British population has the reputation of not moving far, although there are French recoveries of pulli ringed elsewhere in the British Isles.

Peakirk, Northants (adult) 7.4.71	Framingham Earl (corpse) Summer 1973

Barn Owl

Boughton (pullus) 5.8.68 — Bintree, Fakenham (dead) 5.4.73

Kingfisher

There is little positively known of the movements of the Kingfisher, and these two, though interesting, do not add much to our knowledge. They are the first proved to have crossed the County borders.

Salthouse 7.11.72 — Buckenden, Hunts. (dead at Gravel Pit) 3.4.73

Abberton, Essex 31.8.72 — Anglia Square, Norwich (skeleton in gutter below window) 8.10.73

Swallow

Little Plumstead (pullus) 10.6.72 — Firgrove, Cape, S. Africa 20.2.73

Boughton (pullus) 14.8.71 — March, Cambs. 26.9.71

Long-tailed Tit

The movement from Winterton to Dorset refers to *two* birds, BTO rings 801023 and 801027, that travelled the 340 km in two weeks, presumably together.

Winterton 15.9.73 — Upper Sheringham (control) 29.11.73

Winterton 7.10.73 — Brownsea Is., Poole Harbour, Dorset (control) 22.10.73

Bearded Tit

Recent recoveries support the theory that there is a northerly dispersal along the east coast of birds from Kent and Suffolk, with sight records and recoveries suggesting an extension of the movement westwards along the Norfolk coast towards the Wash. Besides the following there are numerous others from Suffolk in autumn to the usual Norfolk localities in winter.

Murston, Kent (juv.) 5.6.72 — (i) Salthouse 31.10.72 (see *Norfolk B.R.* 1972)
(ii) Murston (breeding) 29.5.73

Salthouse 19.9.72 — Ely, Cambs. (control) 27.2.73

Salthouse 2.10.73 — Hornsea, Yorks. (control) 13.10.73

Fieldfare

Holme 16.11.72 — Spalding, Lincs (dead) 28.2.73

Song Thrush

This recovery may usefully be compared with the series in the Norfolk B.R. 1972 p.26

Salthouse 5.10.71 — Stokholm, Denmark (dead) 14.10.73

Redwing

The tendency is for this species and the Fieldfare to move further to the south during subsequent migrations.

Salthouse 2.11.70 — Vila Vicosa, Portugal (caught) 26.12.72

Mintlyn 27.2.72 — Andelain, Aisne, France (killed) 5.10.73

Blackbird

There are recoveries from various parts of Scandinavia, and from elsewhere in the British Isles, the most distant being given here in full.

Boughton 20.2.72 — Hajala, Turku ja Pori, Finland 27.4.72

Holme 13.10.72 — Delgany, Wicklow, Eire 31.1.73

Redstart

This individual lived to a considerable age.

Holme 25.9.65 — Bonskaret, Harnosand, Sweden (dead) Summer 1972

Robin

Skegness, Lincs 14.10.72 — Wiveton 16.10.73

Titchwell 5.6.72 — Huddersfield, Yorks 26.3.73

The earliest Norfolk ornithologists recorded large numbers of Common Terns nesting on islands in Hickling Broad, but these sites were deserted in the last Century. The species returned in 1953 and up to eight pairs breed annually on the wader grounds at this National Nature Reserve.

Bearded Tits continue colonising new reedbeds; in 1973 two pairs reared young in a dyke adjoining Breydon estuary wall. Other breeding localities are known in the lower Waveney and Yare valleys.

Cetti's Warbler

A remarkable occurrence, the first foreign recovery from the Belgian breeding stock, and the first official record for the county. It was found dead in the centre of Norwich after apparently hitting a window.

Hensies, Hainaut, Belgium (juv.) 23.8.70 — Norwich 28.6.73

Sedge Warbler

Holme 5.8.71 — El Khemis Negga, Safi, Morocco 24.11.73

Spotted Flycatcher

It is strange that this bird should be in S. France during the breeding season.

Stow Bedon 4.9.69 — Menton, Alpes Maritimes, France (dead) 22.6.71

Pied Wagtail

Earlham 21.9.70 — Snettisham (decomposed) 7.5.73

Starling

No remarkable recoveries were received. Birds went to Germany and to the Netherlands (4), and came from the Netherlands (4). There were some more distant movements within E. Anglia and one to St. Albans, Herts.

Greenfinch

Several more local movements within E. Anglia and into Lincs. and Humberside were notified. The following are more distant than usual.

Hollington, Sussex 16.1.72 — Sheringham 21.1.73
Holme 19.12.72 — Egham, Surrey (control) 1.5.73
Whitlingham 6.3.71 — Sutton Valence, Kent (dead) 5.7.73

Goldfinch

Gorleston 24.6.73 — San Agustin de Guardaliz, Madrid, Spain 7.12.73

Bullfinch

Another species not known to travel very far.

Gibraltar Point, Lincs. 20.12.70 — Holme, (control) 15.12.72

Chaffinch

Netherlands 27.10.69 — Holme (control) 11.12.72
Boughton 6.3.71 — Ingatestone, Essex 25.2.73

Yellowhammer

Salthouse 10.10.71 — North Somercotes, Lincs. 28.1.73

Siskin

Wiveton 14.11.72 — Woodbridge, Suffolk 21.4.73

Linnet

Jaixkibel, Guipuzcoa, Spain 29.4.73 — Upper Sheringham 28.8.73

Redpoll

The list contains certain unprecedented movements. The bird from the Netherlands seems to be a late migrant, and the movement to Devon is in sharp contrast to the pattern we have come to expect. All the following were controlled

Ash, Surrey 27.2.72 — Upper Sheringham 12.6.73
Netherlands 5.5.73 — Holme 31.5.73
Leziate 3.9.72 — Rollogem, Flanders, Belgium 9.10.73
Leziate 18.8.73 — Castricum, N. Holland, Netherlands 2.11.73
Leziate 17.10.73 — Ottery St. Mary, Devon 28.12.73

Classified notes

These notes are based on *Birds of Norfolk* (1967) where fuller details regarding status, distribution, migration and ringing recoveries may be found. Important records for Wisbech Sewage Farm (part of which is on the Lincolnshire side of the county boundary) have been selected from the files of Cambridge Bird Club. Fuller details of Wash and Fen records may be found in the *Cambridge Bird Club Report* for 1973.

The order used is that of the B.T.O. guide *A Species List of British and Irish Birds* (1971) and English names follow current practice. Observations refer to 1973, unless otherwise stated. To save space, all but the most essential initials have been omitted. Records are of *single* birds unless otherwise stated.

Great Northern Diver: Usual autumn and winter records of singles with one off Winterton Ness June 3rd.
Great Crested Grebe: See separate feature for the results of a full county survey.
Red-necked Grebe: Wash/North coast: Ones and twos at seven localities up to Feb. 11th and from Sept. 16th.
Slavonian Grebe: Wash/North coast: Ones and twos at six localities up to March 9th and from Oct. 21st. Inland: Sparham GP Dec. 11th.
Black-necked Grebe: North: Wells Abraham's Bosom Sept. 29th. Broads: Salhouse April 26th.
Little Grebe: Few breeding records received but surprising total of 8 pairs along Breydon South Wall dyke. More widespread in winter when 2 in Wensum in centre of Norwich at Quayside.
Fulmar: North: A total of 54 young was counted by JM Aug. 14th - 16th on cliff ledges between Weybourne and Cromer as follows:

Weybourne - Sheringham 18
Sheringham - West Runton 9
West - East Runton 11
East Runton - Cromer 16

At least 8 returned Nov. 6th. Wash: Hunstanton: 20 pairs by early March and 4 young left the ledges; 7 returned Dec. 9th.
Manx Shearwater: North coast: Apart from one off Sheringham May 4th and 4 off Cley on 19th, all observations between mid-July and Oct. 21st; no party exceeded 15. Peak day was Sept. 30th when gale-force winds and records included 12 in Wash off Wolferton.
Great Shearwater: North: Cley/Sheringham Sept. 30th (DFM, JM, MPT). East: Happisburgh Oct. 6th (BMEU).
Sooty Shearwater: North coast: Sept. total of over 60 with majority passing on 30th during gale. Also 4 off Hunstanton Oct. 21st.
Storm Petrel: North: Cley Sept. 23rd and Nov. 13th; Holme Oct. 21st
Leach's Petrel: North: Weybourne and Holme Sept. 30th.

Gannet: North: September movements include 300 east off Cley on 10th and 150 on 30th when 125 off Holme and 200 off Hunstanton.

Cormorant: East: Continues to increase at Breydon where maximum of 131 Dec. 2nd; majority roost at Ranworth but some have moved to Fritton Lake.

Grey Heron: Following heronries were counted:
Borders of Wash: Snettisham 24 nests. *Fens:* Hilgay 12, Islington 58 and Denver Sluice 13. *Brecks:* Didlington 10, Shadwell 3 and Narford 8. *Mid-Norfolk:* Beetley Hall 1, Horningtoft (new) 3, Shipdham (new site) 3, Sparham 1 and Elsing 3. *Broads:* McHardy's Wood 6, Heigham Sounds 22, Waggonhill Wood 4, Wickhampton 16, Buckenham 30, Strumpshaw 2, Ranworth Marshes (Horning Hall) 10, Barton (Heron's Carr) 8, Wheatfen 10, Upton 4, Belaugh 12, Wroxham 1, Ranworth 23 and Woodbastwick Marshes (occupied since 1972) 6.
North: Cley 6.
South: Billingford (Thorpe Wood) 3.

Little Bittern: North: Weybourne male May 6th to 10th (AJLS *et al*).

Bittern: North: Cley pair bred successfully. Brecks: singles in winter at Stanford, Sturston and Thompson.

Spoonbill: Fens/Wash, North/East coasts/Broads: 1 - 3 at Welney, Snettisham, Holme, Cley, Breydon and Hickling between March 25th and Oct. 27th. Two remained at Martham Broad between June 16th and July 15th.

Garganey: Spring arrival from March 11th and subsequently at 8 localities.

Gadwall: Largest Breck counts include 61 at Didlington Jan., 202 at Stanford Water Sept. and 150 at Thompson Water, 49 at Shadwell and 58 at Mickle Mere all in Oct.
North: Gunton Park 165 Oct. 22nd and 200 Nov. 5th. Broads: Horsey Mere over 100 in Jan.

Wigeon: East: Yare valley floods attracted up to 3200 at a single marsh in second half of December.

Pintail: Breck: Up to 15 at Stanford, Mickle Mere and Narford. East: Breydon, maxima 153 Feb. 9th.

Shoveler: Breck counts include 69 at Mickle Mere. East: Buckenham 57 Dec. 20th.

Red-crested Pochard: North: Weybourne immature Sept. 24th (BWJ).

Scaup: Wash: Snettisham maximum of 256 Jan 11th.

Tufted Duck: Breeding records: 24 pairs bred in Brecks at 9 sites; elsewhere a minimum of 27 pairs at 10 sites.

Pochard: Breeding records: none received for Brecks, but elsewhere total of 14 pairs at 7 sites.

Ferruginous Duck: East: Hardley Flood drake Jan 21st (CRG).

Longtailed Duck: Wash: Hunstanton monthly maxima as follows:
Jan. 65, Feb. 20, March 97, April 28, Nov. 11 and Dec. 19.
North coast: Occasional records of up to 11 till March 11th and from Oct. 11th.
East: Gorleston up to 12 till April 7th and a pair assuming summer plumage on 11th: 1 - 5 from Nov. 1st onwards. Waxham drake May 7th.
Wash- Snettisham 1 - 2 from Dec. 2nd. Inland: Swanton Morley GP 1 - 2 Nov. 4th to 17th and Stanford Dec. 26th.

Velvet Scoter: Wash/North coasts: Recorded each month except June. No party exceeded 17 apart from 36 off Snettisham in Feb. and 55 - 75 off Heacham in March/April.
East: Gorleston monthly maxima Jan. 17, Oct. 5 and Dec. 11.

Common Scoter: Largest assemblies include: Wash, Hunstanton 600 second half of December and East: Gorleston 200 Oct. 23rd.
Eider: Recorded each month. Largest flocks for main localities only are given:
East: Gorleston 25 Dec. 31st.
North: Scolt Head 40 Dec.
Wash: Wolferton/Snettisham/Heacham 144 mid-March.
Red-breasted Merganser: No large numbers reported.Wash: Hunstanton, maximum of 20 in Jan. and Dec.
Goosander: Winter observations from usual localities including 10 at Sparham GP, 26 at Swanton Morley GP, 5 at Gunton Park, 7 at Stradsett, 5 at Narford and 5 at Holkham.
Smew: Winter records at 4 sites including 5 at Cley (2 drakes) Nov. 30th.
Shelduck: Wash: Total of 200 young assembled off Ouse Mouth Aug. 31st. 1500 at Wolferton in early July; moult migration commenced on 14th with groups of 50 to 70 departing each evening until 27th. Winter maximum 1800 at Wolferton in Jan.
East: Yarmouth, a family party at sea failed to enter the harbour due to presence of small craft, June 24th,
Egyptian Goose: Reported at Barton, Cley, Holkham, Hoveton, Lenwade, Lyng, Narford, Swanton Morley, Sparham, Salhouse and Wroxham.
White-fronted Goose: East: Breydon area, maximum of 32 between Jan. 14th and March 4th and 2 - 7 from Dec. 9th. Elsewhere in Yare valley 7 from Dec. 4th.
North: Cley 32 in January; Holkham 132 till March 11th and 85 from Dec. 9th.
Fens: Welney 16 in Jan.-Feb.
Bean Goose: East: Up to 77 in usual area till March 8th; 16 returned Nov. 13th (earliest arrival date recorded) increasing to 71 by 27th and 104 from Dec. 20th. Interesting coastal observation of 14 in wheat at Winterton Feb. 25th.
North/Wash: Singles at Cley and Holkham with 3 at Snettisham.
Pink-footed Goose: East: Breydon parties of 8 (Jan.) and 3 (Nov.)
Wash: Snettisham area, Jan. maximum 1816 and last 22 on March 27th. 98 returned Oct. 19th with 726 by end Nov. and 1158 by end December.
North: Cley, 35 Jan. 4th.
Snow Goose: East: Single amongst Bean Geese from Nov. 13th onwards.
Brent Goose: Maximum numbers at regular localities as follows: Breydon 37, Blakeney - Morston 1500, Wells 350, Brancaster 1200 and Hunstanton/Heacham 305.
Barnacle Goose: East: Breydon Jan. 14th and with Bean Geese in Yare Valley from Nov. 27th.
North: Weybourne Nov. 18th.
Wash: Snettisham Feb. 25th and March 15th.
Whooper Swan: Winter records at 10 localities with an early Cley arrival Oct. 1st. Largest herds at Welney where 23 in Jan. and 30 by end of year.
Bewick's Swan: Recorded up to March 19th and from Oct. 14th. Largest concentration at Welney Washes where 600 by late Jan. and 800 present by year end. Elsewhere largest assemblies at Haddiscoe/Thurlton (73 Feb. 12th), Breydon (95 Dec. 9th) and Muck Fleet (76 Feb. 25th). In addition total of 118 in Breydon area at end of year (75 on Breydon and 63 at Stokesby).
Easterly spring exodus most noticeable March 9th (40 Earlham) 17th (53 Stoke Ferry) and 19th (79 Snettisham and 72 Costessey). Westerly passage from late Oct.; on Dec. 2nd for example 37 over Norwich and later Hethersett, 43 over Thorpe St. Andrew and 40 over Breydon.

Buzzard: Ones and twos at 12 localities between Feb. and August; also 6 soaring together over Ebridge Mill April 25th (a group of 10 appeared at Minsmere April 29th *S.B.R.*).

Rough-legged Buzzard: Wash: 2 in the Wolferton - Sandringham - Snettisham area until March 21st.

In autumn an invasion commenced Oct. 20th and between then and the end of December birds reported at Billockby, Beeston Common, Blakeney Point, Cley, Coltishall, Croxton, Hickling, Holme, Kelling, Morston, North Wootton, Overstrand, Sandringham, Salthouse Heath, Stiffkey, Sheringham, Somerton, Snettisham ,Titchwell, Waxham, Weybourne, Wells, Winterton and Wolferton.

Majority of observations related to singles, but 4 at Winterton Nov. 4th and totals of 9 at Cley Oct. 26th (including 6 moving west) with 6 there on 28th.

Sparrowhawk: Records from 40 localities but no breeding successes reported.

Red Kite: Wash/N/E coasts: Snettisham Jan. 14th to March 15th, Happisburgh and Winterton March 22nd and Cley on 23rd/24th. All observations could relate to same individual.

Honey Buzzard: North: Single at 3 localities between July 14th and Sept. 24th.

Marsh Harrier: Broads: Hickling, Horsey and Martham up to 3 throughout year. Frequent coastal observations (including Wash and Wisbech SF) of ones and twos in spring/autumn.

Hen Harrier: Late Spring birds at Salthouse Heath, April 23rd, Holme on 27th and Itteringham on 28th. Autumn return from Sept. 27th (Cley). Usual localities and mainly singles, but 3 each at Winterton, Salthouse Heath and Holme and 4 at Snettisham.

Montagu's Harrier: North: At the site occupied 1970-72 a female present April 26th to mid-June, but no breeding attempt. Broads: Pair present but nest with 4 eggs later deserted.

Passage birds during May at Winterton, Brancaster, Thornham and Snettisham.

Osprey: Single birds at Alderfen, Blakeney Point, Barton, Catfield, Cley, Holme, How Hill, Hoveton, Mickle Mere, North Wootton, Snetterton, Snettisham and Wroxham. Extreme dates May 7th and Sept. 17th.

Hobby: Total of 13 between May 13th and Sept. 23rd at 10 localities.

Peregrine: Total of 7 at 7 coastal localities.

Red Footed Falcon: At least 7 records of this summer visitor to eastern Europe: Snettisham May 19th (RB), Burnham Overy Staithe on 20th (JAWM), Holme on 21st (PRC), Salthouse on 26th (MAB, WEF, PTS), Wells June 1st (HE), Holme July 12th (PRC) and Aylmerton Aug. 4th (GED).

Quail: Summer records from Ditchingham, East Wretham, Longham, Santon Downham, Titchwell and Warham.

Golden Pheasant: Brecks: Recorded at Langford, Shadwell, Santon Downham, St. Helen's Well, Thompson Common, Two Mile Bottom, Weeting, West Tofts, and West Harling.

West: Recorded at Sandringham.

Lady Amherst's Pheasant: Successful breeding at Guist and Quidenham.

Water Rail: Breck: Winter records at Stanford, Buckenham Tofts, Mickle Mere, Foulden and Langford. Interesting November observations from Sheringham (one in town centre during cold spell on 29th) and from Smallburgh (one entered a house and was captured in a pantry on 24th).

Spotted Crake: Broads: Woodbastwick Jan. 4th - 18th.

North: Holme Oct. 1st; Cley one Aug. 24th to Oct. 14th with 2 between Aug. 30th and Sept. 2nd.

Oystercatcher: Breeding records of *pairs:*
East: Breydon area 5 (3 on north wall marshes and 2 on south side).
Broads: Repps 2, Cold Harbour Ludham one and Horsey 2.
North: Blakeney Point 70, Wells (Lodge Marsh) 12, Scolt Head 150 - 160, Brancaster golf course 3 and Titchwell 13.
Inland: Binham one.
Wash: Wolferton Saltings 3 and total of 14 between Heacham and King's Lynn.
Ringed Plover: Breeding records of *pairs:*
Wash: King's Lynn to Wolferton 3 and Wolferton to Heacham 30.
North: Hunstanton to Thornham Channel 13, Thornham to Brancaster 65 (including 25 on Titchwell RSPB Reserve and 2 on Brancaster golf course), Scolt Head 150 - 160, Gun Hill to Wells 2, East Hills and Bob Hall Sand 10, Stiffkey Binks 10, Blakeney Point 140, Cley to Weybourne 2 - 3, Mundesley one and Bacton area 2.
East: Waxham one, Horsey to Winterton 5 and Breydon 2.
Broads: Hickling 2 (including one in sugar beet).
Fens: Stoke Ferry one.
Breck: East Wretham one and Santon Downham 2.
West: Gravel pits near King's Lynn 3. (Summary by JGG.)
Little Ringed Plover: Breeding: Total of 15 pairs summered at 10 sites; 19 young reared. First breeding birds arrived April 8th. At one former site (extensive gravel workings) the presence of 5 pairs of Ringed Plovers may well explain the disappearance of Little Ringed Plover.
Passage birds at usual localities between March 22nd (Holme) and Oct. 11th (Wisbech SF). In autumn up to 8 at Cantley, 5 at Hickling and 25 at Wisbech SF.
Kentish Plover: North: Cley, singles (male and female) on 10 dates in May from 1st and on 3 dates in June; another Aug. 30th.
Golden Plover: Largest assemblies at Cley (3 - 400 March 26th), Halvergate (500 Jan.) Welney (1000 March), Wells (1000 Feb.), West Runton (700 Nov.) and St. Benet's Level (1000 Dec.).
Dotterel: Total of 15 in spring as follows: Swanton Morley aerodrome April 30th, Hunstanton May 6th, Panxworth 10 on 7th, Hunstanton on 12th and Titchwell 2 on 20th/21st.
In autumn total of 9 as follows: Blakeney Point Aug. 12th and 15th, Salthouse 2, August 25th, Cley Sept. 2nd, 4th and 19th with 2 on 5th.
Snipe: Bacton: total of 100 tightly packed on green turf at Gas Terminal Dec. 3rd (*per* EAE). At this time 3 observations of Snipe feeding in Sheringham town gardens.
Whimbrel: Westerly passage very noticeable during August. At Holme 90 passed through on 10th with peak of 300 on 21st and 200 on 23rd. At Blakeney Point 50 on 16th with 60 passing Cley on 17th and 58 at Weybourne and 80 at Holkham on 18th. Late birds (2) at Holme Oct. 11th.
Black tailed Godwit: Breeding: Fens: Ouse Washes at Welney 4 pairs bred successfully.
North: Cley, pair arrived March 3rd and 2 young reached flying stage.
Passage movements include 60 at Vinegar Middle, Ouse Mouth March 24th (DLO), 16 at Breydon May 12th and peak of 155 at Wisbech SF July 15th (where 90 July 13th and still 130 on 18th).
Bar-tailed Godwit: Fens: Unusual Sept. passage at Wisbech SF where up to 26 between 6th and 14th.
Green Sandpiper: Peak numbers at Cley where 16 Aug. 14th when 15 at Wissington BF.

Wood Sandpiper: Spring passage May 11th to June 8th and autumn return July 13th to Oct. 17th. No party exceeded 9.
Common Sandpiper: Fens: Wisbech SF, autumn passage July 13th to Oct. 23rd with peak during second half of Aug. when 40 most days. Wissington BF 4 late birds Nov. 18th.
East: Hardley Flood, excitable flock of 40 alighting on waterside trees Aug. 21st. Breydon winter record on Dec. 9th.
Spotted Redshank: Recorded each month. Most favoured locality was Wisbech SF where present in autumn from July 5th to Oct. 26th with peaks of 50 Aug. 18th, 24 Sept. 24th and 40 to 45 Oct. 23rd to 26th. Inland, an interesting observation of one at Costessey Aug. 11th.
Lesser Yellowlegs: Fens: Wisbech SF Oct. 11th (BWJ) and 26th (JAWM).
Greenshank: Largest assemblies at Holme (30 Aug. 12th and present till Nov. 10th, and at Snettisham (25 end of July and 27 from end Aug. until mid-Sept.). At Wisbech SF present July 5th until Oct. 5th but no party exceeded 12.
Purple Sandpiper: North coast/Wash: Recorded all months except April, June and July. Localities as follows: Blakeney Point 1, Brancaster 1, Cley 1, Heacham 3, Hunstanton 5, Salthouse 1, Sheringham 4, Snettisham 2, West Runton 1, Weybourne 3 and Yarmouth 1.
Little Stint: North coast: Cley, spring passage of 1 - 4 between May 1st and June 8th. In autumn up to 12 together at Cley and 7 at Holme.
Fens: Wisbech SF; present between July 26th and Nov. 24th; no August party exceeded 9, but increase to 34 by Sept. 17th and peak of 80 on 28th with still 60 Oct. 5th.
Temminck's Stint: Fens: Wisbech SF May 19th, Aug. 18th and 26th and Sept. 6th to 19th. Wissington BF Aug. 22nd.
North: Cley May 2nd to 21st with 2 on 27th/28th and singly Aug. 23rd and Sept. 2nd and 25th.
White-rumped Sandpiper: North: Cley, Aug. 11th - 15th (SCJ, JE *et al*) and Thornham Oct. 24th (BLS).
Fens: Wisbech SF July 28th to Aug. 10th (KA, JAWM *et al*).
Pectoral Sandpiper: Fens: Wisbech SF Aug. 18th - 26th, Sept. 5th - 17th and 24th - 30th.
North: Cley Aug. 13th - 17th and Sept. 8th - 13th.
Curlew Sandpiper: East: Breydon 2 May 20th and up to 16 in autumn between Aug. 3rd and October 21st.
Wash: Snettisham, peak of 28 Sept. 16th.
Fens: Wisbech SF present July 13th to Oct. 26th with peaks of 16 in August (2nd), 35 in Sept. (28th) and 28 in Oct. (3rd).
Buff-breasted Sandpiper: North: Cley Sept. 1st to 19th (MRA, PC *et al*).
Broad-billed Sandpiper: North: Cley May 28th to 31st (WEF, DS, MT *et al*).
Additional 1972 record: Salthouse Aug. 25th (MW).
Ruff: Breeding: Fens, Ouse Washes 4 Reeves believed to have bred at Welney.
Wintering birds at Welney (60) Hickling and Cley. Usual *passage* records including up to 50 at Cley in Aug., 45 in Sept. and 55 in Oct. At Wisbech SF autumn monthly maxima as follows: July 110, Aug. 130, Sept. 100, Oct. 70 and Nov. 40.
Avocet: For the first time, records of this former rarity have been summarised.
North/East coasts: Recorded at Breydon, Kelling, Salthouse, Cley, Brancaster and Holme between April 15th and Sept. 16th. Mostly between 1 and 3, but also parties of 5 and 7. Also of interest 2 south at Gorleston during gales April 2nd, and at Breydon one remained from Nov. 3rd to Dec. 7th.

Grey Phalarope: North: Cley, Sept. 29th/30th with 2 between Oct. 13th and Nov. 6th and another Dec. 15th.

Red-necked Phalarope: Broads: Hickling Aug. 23rd/24th.
Fens: Wisbech SF Aug. 8th to 11th with another Aug. 18th to 20th and a third between Sept. 8th and Oct. 11th.

Wilson's Phalarope: North: Cley Oct. 21st/22nd (AGD, PML *et al*).

Stone Curlew: In Brecks returned from March 12th.
North: A pair bred successfully on a disused aerodrome.

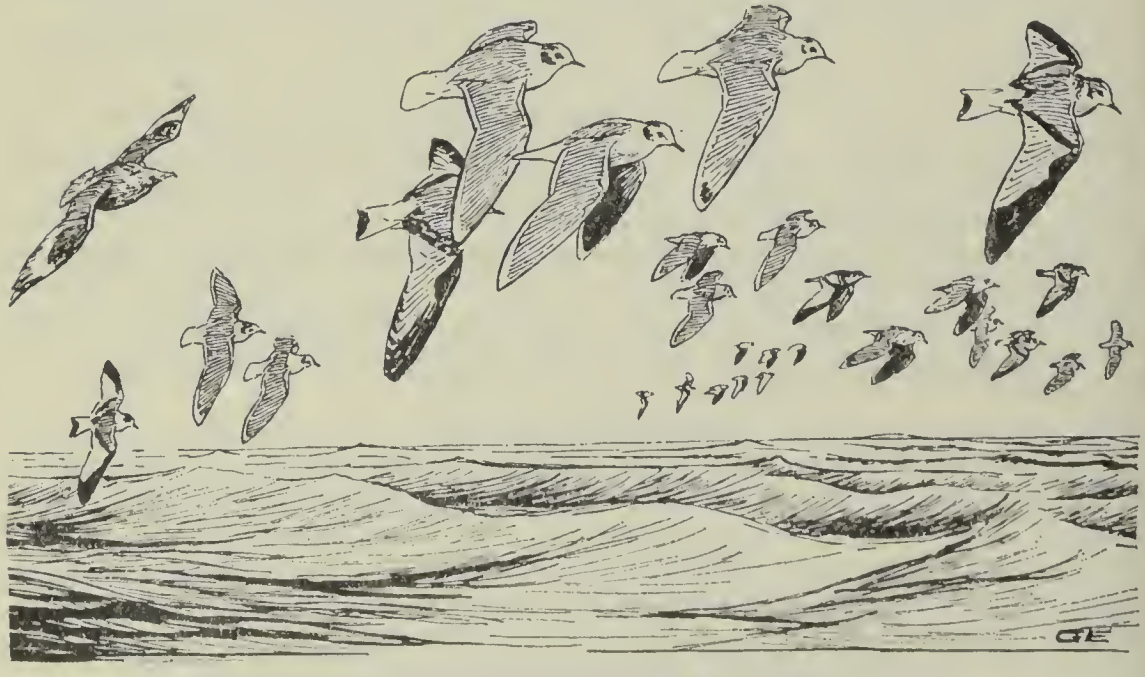
Great Skua: East: Winterton one heading inland mobbed by Swallows Sept. 16th.
Inland: Swanton Morley GP Sept. 29th.
North coast: Autumn passage between Aug. 15th and Dec. 14th with largest movements Sept. 30th (when force 8 N.W. gale resulted in 50 off Weybourne, 150 off Cley/Salthouse, 81 entering Wash off Holme and 111 at Hunstanton), Oct. 21st (28 off Sheringham) and Nov. 6th (21 off Sheringham and 57 off Hunstanton).
Wash: Ouse Mouth 8 Sept. 19th and Snettisham 26 on 30th.

Pomarine Skua: East: Gorleston Dec. 5th.
North: Autumn passage between Aug. 7th and Dec. 8th; largest numbers during gales on Sept. 30th when 27 off Weybourne, 15 off Cley, 5 off Holme and 1 off Hunstanton.

Arctic Skua: N/E coasts: Autumn movements between July 15th and Nov. 6th with impressive storm movement Sept. 30th when 135 off Weybourne, 200 off Cley, 26 off Holme and 36 off Hunstanton.
Wash: Snettisham 140 Sept. 30th and Ouse Mouth 16 Nov. 6th.
Fens: Wisbech SF June 14th and Sept. 30th with 2 picked up dead next day.

Long tailed Skua: North coast: Singles on five dates between Aug. 15th and Sept. 30th.
Fens: Wisbech SF one dying Oct. 3rd (CBC).

Herring Gull: *Breeding:* North: Blakeney Point, 2 nests but no young reared.



Storm-driven Little Gulls followed by a Great Skua.

Above: Attracted by Norfolk's broads, meres, estuaries and flooded pits, Ospreys are regular passage migrants. Most records are of singles, but occasionally two appear together.

Below: Although greatly decreased as a breeding bird, Continental Lapwings visit Norfolk in large numbers each autumn and winter.

Singles with yellow legs at Hickling Broad Aug. 23rd (MJS) and at Holme Oct. 2nd (HBO). Additional 1964 yellow-legged Herring Gull record at Yarmouth harbour entrance Aug. 15th (PRA).

Common Gull: North: Blakeney Point a pair bred rearing 3 chicks.

Glaucous Gull: North coast (particularly Blakeney Point to Sheringham) ones and twos up to April 25th and from Aug. 22nd.

East: Winterton Nov. 18th.

Inland: Aylmerton Nov.

Iceland Gull: North: Following probably all relate to the same immature: Sheringham April 10th, Kelling on 12th and Cley on 20th.

Mediterranean Gull: North: only 2 records: Weybourne Aug. 6th (DFM) and Cley Sept. 29th (TH).

Little Gull: North/East coasts, Wash, Broads (Hickling, Martham, Ormesby), Fens (Wisbech SF and Lynn BF). Recorded all months except Jan. and March with numerous May and Aug. - Oct. observations. Mostly either singles or small parties up to 11, but 16 off Hunstanton Sept. 30th and 14 there Oct. 21st.

Inland record of one at Swanton Morley GP May 2nd.

Black-headed Gull: Numbers of *pairs* at breeding sites include:

East: Cantley 50.

Broads: Horsey 30 - 40, How Hill 50 and Hickling 5.

Fens: Wissington 21 and Wisbech SF 170 - 200.

North: Lodge Marsh Wells 1,000, Titchwell few, Morston 500, Blakeney Point 200, Salthouse Broad 20, Scolt 200 and Stiffkey 20.

Wash: North Wootton 60. (Summary by JGG).)

1972 Report makes reference to gull casualties when following ploughs. After discussions with 5 local tractor drivers MAB of Corpusty reports total of 4 birds trapped (but released) last season.

Sabine's Gull: North: Weybourne 2 adults Sept. 30th and one next day, Cley immature Sept. 19th and 4 (3 immatures and 1 adult) on 30th, Holme adult Sept. 30th and Hunstanton immature Sept. 27th.

Kittiwake: Breeding attempt again made at a cliff-site in N.E. Norfolk, but nest containing 2 eggs dislodged and later found on beach.

Weather movements include easterly passage off Weybourne Oct. 11th at the rate of 1,000 per hour for 2 hours.

Black Tern: Passage migrants between April 27th and Oct. 15th with a straggler at Hickling Nov. 1st. Largest spring parties May 18th to 20th when 15 at Cley, 12 at Swanton Morley GP and 12 at Snettisham. Autumn movements on a very small scale.

White-winged Black Tern: North: Cley/Salthouse immature Oct. 1st to 10th (JM *et al*).

Gull-billed Tern: North: Weybourne Aug. 18th (CJ, LM, AJMS).

Caspian Tern: Broads: Hickling one July 31st was joined by a second bird Aug. 3rd. Both remained till 8th with one lingering till 12th (RDH, MJS).

Common Tern: Numbers of *pairs* at breeding sites:

Wash: Snettisham 48 and Wolferton Saltings 2.

North: Scolt 600, Stiffkey Binks 141, Lodge Marsh Wells 6, Blakeney Point 1400, Brancaster 4 and Cley (Arnold's Marsh) 14.

East: Scroby Sands, small colony but no figure available.

Broads: Ranworth 57, Hickling 3, Ormesby 8, Barton 2, Hardley Flood 9, Hoveton Great Broad 1, Salhouse Little Broad 1, Hudson's Bay 1 and How Hill 3.

Inland: Swanton Morley GP 1 and Lyng GP 2.

Arctic Tern: North: Breeding *pairs:* Scolt 1 and Blakeney Point 3.
Roseate Tern: North: None bred but 1 - 3 on a number of dates between April 29th and Aug. 31st.
Little Tern: Breeding records of *pairs* include:
Wash: Snettisham 1.
North: Thornham Harbour 6, Scolt Head 40 (3 flying young), Blakeney Point 150, Stiffkey Binks 20, Wells 1 (2 flying young) and Cley 4.
East: Winterton/Horsey 87 (9 flying young), Horsey Gap 1 (no young), Horsey/Waxham 2 (1 young), Hemsby/Winterton none bred and Breydon Water 2 (1 flying young—a new site).
Broads: Hickling 2.
Sandwich Tern: North: Scolt 800 pairs bred rearing 900 young; Stiffkey Binks 3500 pairs bred rearing 3000 young. None nested at Blakeney Point. Spring arrival from March 22nd.
Little Auk: North: Cley Sept. 6th and 30th and Weybourne Oct. 11th.
Black Guillemot: North: Total of 23 in Jan., Feb., Oct. and Nov.
Puffin: North: Total of 41 in May, Sept., Oct. and Nov.
East: Yarmouth April 24th.
Turtle Dove: Notable passage records include 150 west at Salthouse May 4th. Late birds at Holme Oct. 30th and Winterton Nov. 3rd.
Collared Dove: Only concentrations reported were 200 roosting at Carrow Works Norwich in Dec. when 100 at Mill Farm Wells.
Barn Owl: Reported from 69 localities.
Little Owl: Reported from only 13 localities.
Long-eared Owl: Bred successfully at Upton and East Wretham Heath. Singles at Salthouse Heath and Holkham and migrants at Blakeney Point Sept. 13th/14th and at Hunstanton G.C. Aug. 30th.
Short-eared Owl: Breeding record of a pair at Haddiscoe (3 young reared). Wintering birds again most abundant in S.E. Norfolk and at Halvergate 80 on several dates in Jan. By contrast virtually absent from this area towards year-end and only a single occurrence reported.
Wash records include 8 at Wootton in Feb. and 5 at Snettisham in Oct. Interesting record from Cley where 3 in from sea Oct. 11th.
Nightjar: Spring arrival from May 12th. In Breckland recorded at 34 sites, majority on Forestry Commission clear-fell areas.
Swift: Extreme dates: April 17th (Norwich) and Sept. 29th (Cley). 2 pairs nested in cliffs at Hunstanton.
Alpine Swift: North: Cley, May 30th (NVA, AGD, GAM.).
Kingfisher: Recorded at 66 localities.
At Sheringham one visited a garden pool at 1400 hours when it contained some 60 young goldfish about 2inches long. The pond was covered apart from about 8 square inches. By 0800 hours next morning only 8 fish remained.
Bee-eater: East: Winterton 2 Aug. 8th (IL) and again on 25th (RG) and 2 over Caister-on-Sea Sept. 2nd (RG).
Roller: Breck: East Wretham Heath May 27th (RAH) and Weeting on 28th (RPB, PN, NJR) doubtless relate to the same bird.
North: Wells Aug. 8th to 16th (PRB *et al*).
Hoopoe: Total of 4 as follows: Hardwick March 17th/18th, Welney May 18th, Lang Mere May 25th and South Walsham July 16th/17th.
Lesser Spotted Woodpecker: Recorded at 41 localities.

Wryneck: In *Spring* total of 4 at Holme, Holkham and Kelling April 29th, May 26th and June 2nd/6th.
In *Autumn* recorded on many dates between Aug. 16th and Oct. 5th with majority between last week of Aug. and mid-Sept. Noted at Blakeney Point, Cley, Holkham, Holme, Hunstanton, Muckleboro' Hill, Paston, Sheringham, Yarmouth, Waxham, Wells, Winterton and Woodbastwick. Minimum autumn total of 32 birds.

Woodlark: Breck: Present in breeding season at 4 localities; at main site party of 11 Sept. 9th remained until 23rd.

Shorelark: North coast (Holme to Weybourne) monthly maxima: Jan. 245, Feb. 135, March 55, April 41, May 35, Oct. 64, Nov. 29 and Dec. 30. Largest groups at Cley (80 in Jan.) and Scolt (70 in Jan./Feb.). Extreme dates May 24th and Sept. 22nd both at Cley.
Wash: Snettisham 8 in Jan./Feb. and 3 in Oct.
East: Breydon, Gorleston, Horsey, Paston, Waxham and Winterton. Singles up to April 29th and from Oct. 7th with 10 at Horsey April 1st.

Swallow: Late birds at Holkham Nov. 11th, at Stiffkey on 16th, Sheringham on 17th and at Swanton Morley till 24th.

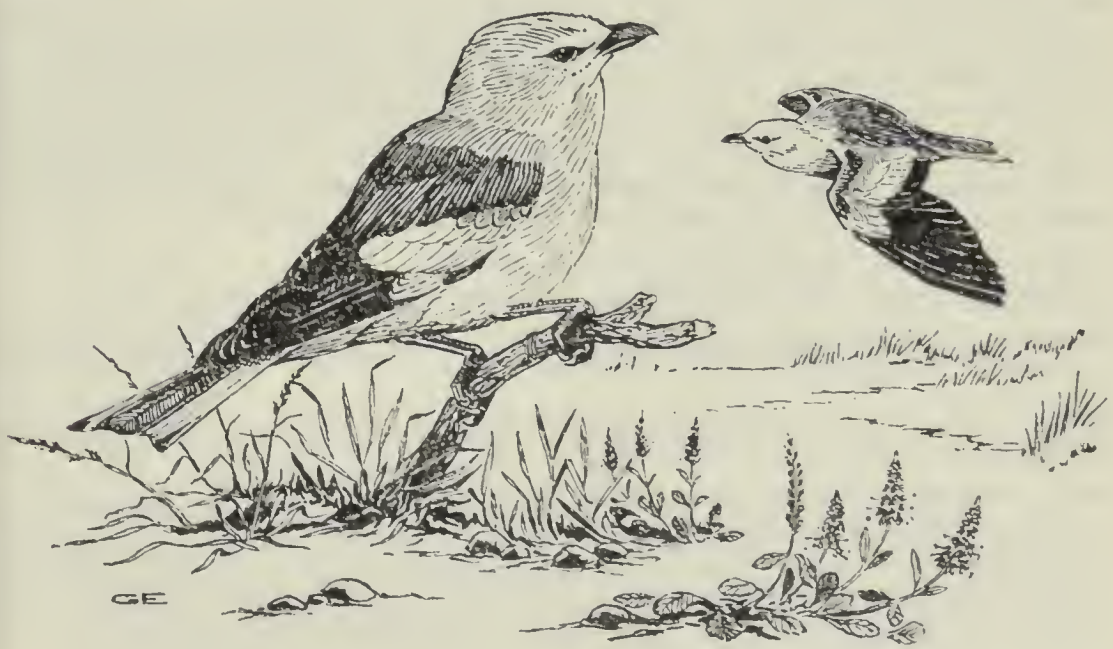
House Martin: Concentration of nests at Home Farm Didlington where 56 nests. November birds at Snettisham on 6th and Taverham on 8th.

Sand Martin: Extreme dates March 24th (Cley and Sheringham), Oct. 24th (Swanton Morley) and Nov. 4th (Cley).

Golden Oriole: Breck borders: At the locality first described in 1970 Report male arrived May 19th; no evidence of breeding.
Passage birds at Surlingham May 30th and at Cley July 1st.

Carrion Crow: Winter roost at Roydon Common attained a peak of 200 in mid-Nov.

Hooded Crow: Peak assemblies of 19 at Bodney duck farm Jan. 18th and 36 at Breydon on 2nd.



Rollers visited East Wretham, Weeting and Wells in 1973.

Dipper (Black-bellied): In spring at Narborough March 1st and for some time previously. In autumn singles at Little Walsingham Dec. 23rd, Beeston Regis Oct. 21st, Elsing end Nov. to Dec. 31st, Honingham end Oct. and Thompson Water Dec. 2nd. In addition 1 - 2 at Keswick between Oct. 27th and Dec. 2nd.

Bearded Tit: Broads: Bred at Hickling, Whiteslea, Heigham Sounds, Horsey, Starch Grass, Martham, Catfield Fen and Bramble Hill (1 pair - a new site).
North: Bred Cley and Titchwell (10 pairs where over 70 in Nov.).
Unusual occurrence at Gunton Park Lake March 28th. In autumn at least 60 (50 trapped) at Salthouse Sept. 22nd; family party at Weybourne mill pool Aug. 28th and 20 at Holme Oct. 6th.
East: Bred Breydon Water (2 pairs in dyke adjoining estuary wall—a new site); Horsey Sandhills 30 in reeds Oct. 19th and at Hardley Flood present all year with maximum of 30 early Jan.
Brecks: Mickle Mere 2 Jan. 7th.
Central: Earlham 6 between Jan. 16th and Feb. 27th.
Wash: Snettisham 5 Oct. 30th.

Fieldfare: Late spring birds at Earlham May 14th and Wells on 16th with stragglers at Whitlingham June 2nd and Holkham on 27th and another at Morley St. Botolph between June 19th and July 5th. First autumn birds Holkham Aug. 26th.

Redwing: May birds at Weybourne on 5th, Earlham in full song on 9th and at Oxnead on 10th. First in autumn Winterton Aug. 25th and Cley Sept. 13th.

Ring Ouzel: Extreme dates April 5th and Nov. 11th with totals of 90 in spring and 27 in autumn. Largest parties 14 at Cley and 11 at Hunstanton GC.

Stonechat: *Breeding:* North: Weybourne, a pair.
East: Winterton - Horsey 3 pairs.

Whinchat: Only one breeding locality reported: Beeston Common.

Redstart: Breeding season birds at Blickling (2 pairs), Felbrigg (3 pairs), Horsford (pair), East Wretham and Madhouse Plantation Thompson. Sad decline in Stanford area in recent years.

Black Redstart: *Breeding:*Yarmouth, spring arrival from March 26th and 3 singing males by April 1st. By mid-June remarkable total of 18 singing males located, including 12 immatures. 17 pairs (probably 18 pairs) bred and a total of 50 young reared. Birds present at one site until Oct. 28th and autumn song recorded at 3 sites (PRA). Sheringham, pair reared 3 young. Norwich present May 9th to Aug. 2nd; at least 2 singing males. A pair raised 2 young from a nest at a height of 90 feet in a partly completed building in city centre.

Migrants: Totals of 46 in spring and 28 in autumn.

Nightingale: Very scarce autumn migrant, but one at Holme Sept. 23rd.

Bluethroat: North: Blakeney Point Aug. 25th - 28th and Sept. 13th - 16th; Holkham Oct. 4th.

Robin: North coast: Large scale arrival Oct. 4th when hundreds at Cley, over 200 at Blakeney Point, 200 at Wells and 80 at Holme.

Cetti's Warbler: Norwich: One found dead in city centre June 28th—the first county record. Now in collections at Norwich Castle Museum (JGG). The bird had been ringed as a first-year bird at Hensies (Hainaut) Belgium on Aug. 23rd 1970. According to the Belgian ringing office bird ringed at the locality where species first known to breed in that country. Since 1966 over 80 have been ringed there.

Savi's Warbler: East: Yare valley one singing May 11th to 15th (MG, MJS).

Icterine Warbler: North: Total of 11 at Blakeney Point, Holme, Kelling, Sheringham and Wells/Holkham between Aug. 12th and Sept. 16th.

Blackcap: January records from Norwich (16th) and Muckleboro' Hill (21st), Feb. from Holme (4th) and Dec. from Breydon (9th) and Holme (10th).

Barred Warbler: North: Total of 12 at Blakeney Point, Cley, Holme, Holkham, Hunstanton and Weybourne between Aug. 18th and Sept. 24th.
East: Winterton Sept. 15th.

Sardinian Warbler: East: Waxham male April 28th - 29th (ELW *et al*). The first county record of this vagrant from the Mediterranean region.

Wood Warbler: Spring arrival from April 27th and breeding season records from 6 sites.
Passage birds at Wells/Holkham Aug. 26th and 30th and at Blakeney Point Sept. 25th.

Arctic Warbler: North: Titchwell trapped Sept. 25th (HBO).

Yellow-browed Warbler: North: At least 8 as follows: Blakeney Point Sept. 24th/25th and Oct. 1st; Titchwell Sept. 23rd and Wells/Holkham singles Sept. 25th and Oct. 28th with up to 3 between Oct. 4th and 11th.

Firecrest: Spring: Total of 12 at Cley, Felthorpe, Holme, Titchwell, Wells and Winterton between March 18th and May 8th.
Autumn: Total of 12 at Happisburgh, Holkham, Salthouse Heath, Swafield, Waxham, Winterton and Yarmouth between Sept. 17th and Nov. 11th.

Pied Flycatcher: Usual small-scale spring passage from May 4th. Late autumn birds at Weybourne till Oct. 13th and at Holme till Nov. 1st.

Red-breasted Flycatcher: North: Autumn total of 13 at Blakeney Point, Cley/Salthouse, Holkham/Wells, Holme and Titchwell between Aug. 28th and Oct. 9th including 5 on Oct. 4th.
East: Yarmouth Oct. 7th.

Dunnock: North: Singles with the wing formula of Continental race trapped at Salthouse Oct. 2nd and at Wiveton on 16th.

Richard's Pipit: North: Cley Sept. 13th and Weybourne Oct. 6th and 12th.
East: Yarmouth Oct. 7th.

Tawny Pipit: North: Cley July 2nd (SDH).
East: Winterton, Nov. 3rd (BWJ, JGG).

Red-throated Pipit: North: Weybourne May 19th/20th (AJLS *et al*).

Water Pipit: Ones and twos at Brancaster, Breydon, Cantley, Colney G.P, Cley/Salthouse, Haddiscoe Island, Sheringham and Winterton up to May 21st and from Oct. 14th.

Grey Wagtail: Nested at 10 sites compared with only 4 in 1972. Passage/wintering birds at 43 localities.

Blue-headed Wagtail: (*M. F. flava*) Spring birds at Cley, Kelling and Sheringham from May 2nd.

Grey-headed Wagtail: (*M. F. thunbergi*) North: Cley May 19th and 21st; Kelling 4 males May 19th and 2 on 20th.

Black-headed Wagtail: (*M. F. feldegg*) North: Cley male May 17th (OL).

Waxwing: Between Nov. 13th and end of the year total of over 70 at following localities: Barningham, Blakeney, Cley, Corpusty, Hassingham, Hemsby, Holme, Holt, Hunstanton, Morston, Old Hunstanton, Sheringham, Snettisham, Thetford, Wells and Yarmouth.

Great Grey Shrike; Singles recorded at the following localities up to April 24th and from Oct. 4th:Blakeney Point, Bridgham, Cley, Egmere, Fowl Mere, Frog Hill, Sturston, Haddiscoe, Hickling, Hilborough, Holkham, Holme, How Hill, Kelling Heath, Lower Kelling, Lyng G.P., Mickle Mere, Paston, Roydon Common, Salthouse Heath, Santon Downham, Sheringham, Snettisham, Sparham, Stanford, St. Helen's Well, Taverham, Thetford G.C., Upper Sheringham, Waxham, Wells, Weybourne, Winterton, Wolferton, Woodbastwick, Wretton and Yarmouth.
One at Wells was singing Oct. 17th.

Lesser Grey Shrike: North: Holme May 27th (PRC, HR).

Red-backed Shrike: *Breeding season distribution:* North: 4 pairs at 3 sites.
East: 3 pairs at one site.
Breck: 5 pairs raised 17 young. Single *migrants* at Cley, Holme, Horsey Gap, Hunstanton and Sheringham between Aug. 18th and Sept. 10th.

Hawfinch: Recorded as follows: Caistor St. Edmunds, Cley, East Somerton, East Wretham, Fakenham, Holkham, Horsey, Mickle Mere, Narford, Narborough and Stanford.
Largest parties at East Wretham where maximum of over 45 Feb. 8th.

Siskin: Majority of records during spring when hundreds at Wells March 28th presumably delayed by cold northerly winds; species abundant at Felthorpe April 26th. In Brecks 80 at St. Helen's Well March 24th and large numbers singing and displaying between Two-mile Bottom and Santon Downham bridge April 19th; at least one pair bred at Two-mile Bottom. In the Sandringham/West Newton area present throughout April and a female collecting nesting material on 13th.

In Broads largest count 50 at Salhouse Broad March 17th; and an unusual observation at Wheatfen where a flight of 25 roosted in a clump of bamboo April 30th.

Twite: Coastal counts include up to 125 at Breydon, 300 at Morston, 300 at Titchwell and 400 at Holme.

Mealy Redpoll: Parties up to 8 at Cley, Caistor, Earlham, Snettisham, Sheringham, Wells, Winterton and Wiveton Jan. to March and Oct. to Dec.

Scarlet Rosefinch: North: Blakeney Point, Aug. 19th/20th (MRA, DJH, NW *et al*). The second county record of this vagrant from Eastern Europe.

Crossbill: Widely distributed in Brecks and records from 13 localities. Smaller strongholds at Wells/Holkham, Sandringham/Snettisham/Wolferton and Sheringham (including 30 in June).
Interesting note on departure at Wells April 15th when flight of 49 headed N.W. to sea after spiralling to a great height.

Brambling: More April records than usual. At St. Helen's Well on 13th scores singing, with 500 at Santon Downham on 15th (again males singing), 50 at Salthouse Heath on 17th and 70 at Sandringham on 18th where one remained until May 2nd. Also late were singles at Wells May 5th, at Upper Sheringham on 22nd and at Bexwell near Downham Market July 28th.

Ortolan Bunting: East: Waxham Sept. 16th.
North: Weybourne May 5th, Sheringham May 7th, Cley 2 Sept. 10th with one on 11th; Blakeney Point immature Aug. 24th and adult on 25th.

Lapland Bunting: North coast: parties up to 18/20 recorded at Cley/Salthouse, Blakeney Point/Morston, Holme, Wells and Weybourne until April 24th and from Sept. 11th.
East: Breydon/Halvergate up to 11 till Feb. 23rd; Winterton 2 Nov. 25th; Horsey Gap male in summer plumage May 1st.

Snow Bunting: Wash/North/East coasts: Reported up to March 16th and from Sept. 11th. Winter maxima include Breydon 24, Cley 250, Holme 250, Scolt 30, Snettisham 50 and Weybourne 110.
Breck: Unusual series of observations at Barnham Cross Common where 1 - 5 between Jan. 7th and March 4th. Other inland sitings at Buckenham Nov. 30th and at Old Catton (Norwich) March 9th.

The following, not mentioned in the Classified Notes, were also recorded in 1973 (*breeding species in italics*): Black-throated Diver, Red-throated Diver, Shag, *Mallard*, *Teal*, Goldeneye, *Canada Goose*, *Mute Swan*, Merlin, *Kestrel*, *Red-legged Partridge*, *Partridge*, *Pheasant*, *Moorhen*, *Coot*, *Lapwing*, Grey Plover, Turnstone, Jack Snipe, *Woodcock*, *Curlew*, *Redshank*, Knot, Dunlin, Sanderling, Great Black-backed Gull, Lesser Black-backed Gull, Razorbill, Guillemot, *Stock Dove*, *Woodpigeon*, *Cuckoo*, *Tawny Owl*, *Green Woodpecker*, *Great Spotted Woodpecker*, *Skylark*, *Rook*, *Jackdaw*, *Magpie*, *Jay*, *Great Tit*, *Blue Tit*, *Coal Tit*, *Marsh Tit*, *Willow Tit*, *Longtailed Tit*, *Nuthatch*, *Treecreeper*, *Wren*, *Mistle Thrush*, *Song Thrush*, *Blackbird*, *Wheatear*, *Grasshopper Warbler*, *Reed Warbler*, *Sedge Warbler*, *Garden Warbler*, *Whitethroat*, *Lesser Whitethroat*, *Willow Warbler*, *Chiffchaff*, *Goldcrest*, *Spotted Flycatcher*, *Meadow Pipit*, *Tree Pipit*, Rock Pipit, *Pied Wagtail*, White Wagtail, *Yellow Wagtail*, *Starling*, *Greenfinch*, *Goldfinch*, *Linnet*, *Bullfinch*, *Chaffinch*, *Corn Bunting*, *Yellowhammer*, *Reed Bunting*, *House Sparrow* and *Tree Sparrow*.

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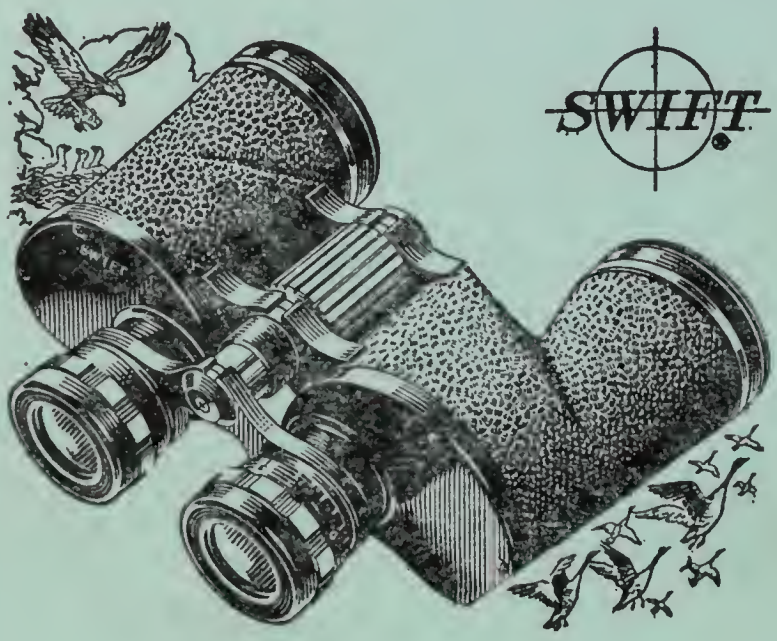

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ADDRESS

Read by the President, Miss Catherine Gurney, to the Members of the Norfolk and Norwich Naturalists' Society at a meeting held in the Central Library Lecture Theatre, Norwich, December 4th, 1973

Ladies and Gentlemen,

Trying to trace the history of Natural History leads one into a subject far too large for a short paper. For this reason I have confined myself to a very simple description of some of the major works, or major types of work, trying to show how the trend of thought and presentation of books has evolved up to the present day. I have been tempted to mention many of the magnificent books published all over Europe and more latterly in America, but for the purpose of this paper these have been avoided and only books published in this country are mentioned; except where the immense influence of men of genius have so affected the world at large that their names and works could not possibly be omitted. So many tantalisingly beautiful books of the eighteenth century dealt more with horticulture than natural history and these too have been cast aside with many regrets.

It would be unwise to think that at the present day we have a more scientific approach, for, to each generation the approach appeared to be the last word in scientific discovery. In another hundred years men of science may well smile at some of our conclusions, especially in the field of nuclear energy and space travel.

Science never stands still, for there are always further discoveries to be made and new ideas to be investigated, but in the Middle ages there did seem to be a darkness over all the land with mental stagnation. This must have been partly due to learning being in the hands of the church. New ideas were suspect, and only the strongest dared to face being branded as a heretic. With the advent of printing learning spread as books became more plentiful, and the laborious copying by hand ended.

Books became less precious and less beautiful. Those equisite volumes on vellum as fine as silk, with glorious illuminations and strange pictures gave way to the coarse heavy wood cuts. This was progress and as more and more people learned to read the demand for books grew and the quality improved until from the latter end of the seventeenth century the flow of magnificent volumes reached their zenith. Knowledge was still in the hands of the few, and when it finally evolved into mass learning for all, content may have improved but quality gave place to cheap production. Now we are moving away from hand drawn plates to coloured photographs and tremendously improved techniques of re-production and printing. Let us go back to the start of Natural History books.

Aristotle (384-322 B.C.) must be the earliest writer whose works have influenced countless seekers after truth. The first copies of his works have not come down to us and were probably destroyed in the fire that destroyed the great library in Alexandria in 42 B.C. when 400,000 volumes perished. By that time many copies and translations had been made of Aristotle's work and although at some point the Greek text was lost, so that his work had to be translated back in to his native language. Aristotle had the genius of being a first

rate observer with the added gift of interpreting his observations. How wonderful it must have been to have been the first to look at, and describe a natural object. He argued and discussed his finds with his pupils at his famous school in Athens known as the Peripatic School, for his lectures were always given walking slowly up and down with his pupils around him. Not all his conclusions were correct but most were far in advance of his time and almost link up with modern thought having leapt over the fantastic myth and legend of the middle ages. He studied and knew of the migration of birds, but was not sure if some swallows did not hibernate. No detail was too insignificant to be mentioned. He discusses the hibernation of fishes and mentions that the "Sheat" fish rises to the surface at the time of the Dog Star and is subject to sunstroke, but is paralysed by a loud peel of thunder. Bees and the workings of the hive he found puzzling. He repeats that some people thought that bees neither copulate nor give birth to young but fetch them from a particular flower. Some say the flower of the reed and others the olive. Whatever errors there are in his works or have crept in during numerous translations Aristotle has influenced the whole of the early scientific world, and can still be read with profit and enjoyment at the present day.

After Aristotle there were few great names that have come down to us with their works. Three must be mentioned who were quoted in all major works up to the seventeenth century. Theophrastus, Pedonius Discorides, and Pliny. Already an effort was being made to divide plants into categories for easy identification. Pliny was a forerunner of this movement but only divided plants into three types. He again was an accurate observer and his passionate interest in the end caused his death, for he died of noxious fumes that rose from the crater of Vesusius in erruption (A.D.77). Pliny had approached too closely to the edge of the crater.

Dioscorides was a Greek medical man, perhaps hardly a Doctor, but attached to the armies of Nero around A.D. 50. His works on plants were justifiably popular in the middle ages and were copied again and again. The first illustrated codex of his *Juliana Arnicia* of 512 A.D. resides in the National Library of Vienna.

Virgil was slightly earlier than the last two writers (70-19 B.C.) and of course a poet rather than a Natural Historian. His Fourth Georgic gives a masterly description of the hive of the honey bee. Possibly he watched the bees on his small country estate, but he falls into one error, imagining the hive was ruled by a king and not a queen. It would be interesting to know at what date this idea was exploded.

The Roman Empire declined and fell and the Dark Ages in Europe began when art and learning seemed to reach a standstill. This may have been partly due to the monastic system, and it is sad to note that religious prejudice has again and again prevented scientific research. Learning centred round the monasteries. They held the monopoly of writing and copying books, and very beautiful these books were, but most of them were books on religious subjects. The fear of being branded as a heretic and savagely persecuted drove research underground.

Books of the twelfth century that became famous were the *Bestiaries*. They are delightful works on vellum with marvellous pictures of the strangest monsters in the colours of the paintbox, reds and blues, decorated with gold. As the

name implies it is a book of animals, but the book starts with the creation of the world, the stars, the firmament, the animals, fishes and reptiles. The pictures of the beasts are so obviously drawn by someone who has never seen the animals in question and the stories in the Latin text are equally delightful and strange. There is a lovely blue bear licking her cubs into shape. She has given birth to three white lumps and for three days she must lick them to turn them into charming furry bear cubs. The story of the lion is in three pictures. In the first the king of beasts kills the cheeky monkey but in the second shows his magnanimity by sparing the man who humbly prostrates himself, while in the last picture he himself is terrified by the small cock crowing on the dung heap.

Another graphic picture is of a hunter clad in chain mail carrying off a lion cub on the pommel of his saddle. The lioness follows him and must be got rid of at all costs so he resorts to the "well known device" of throwing a mirror behind him. She is diverted as she looks in the mirror and the hunter makes his escape. In the picture of the Cranes doing their sentry duty one carries a round stone in his claw. Should he go to sleep, the stone would fall and the noise wake him up!

These marvellous books must have whiled away happy evenings in the halls of noble houses that were lucky enough to possess such a treasure.

Perhaps the earliest of the Medical books to be written in England was the *Leech Book* of Bald. This was penned in the tenth century and was housed for a time at Glastonbury. It is now in the British Museum. Over a thousand years old it is still in good condition. As soon as printing was invented stimulus was given to the production of books and types of medical writing became popular. The earliest of these were the *Hortus Sanitatus* or *Garden of Health*. Many of them were printed in Germany partly for the reason that blocks for the illustrations were used from one book to another. Blocks were costly and made of pear wood backed with a softer wood to make them less heavy. The earliest of these works were in Latin but later editions were translated into German, French and finally English. The English version was produced by one Andrews and published in 1521. Most of the wood cuts are from the earlier works, but from time to time a few new illustrations were added. However, the temptation was to keep on the old illustrations that had gone out of date. Together with more orthodox animals and birds there appeared unicorns, sirens, mermaids and sphinxes, and so the old superstitions and stories continued to be told long after they might well have faded. A copy of Andrew's English version is housed in the University Library at Cambridge and is a rare book. The English is difficult to follow as lettering and spelling are erratic. Besides descriptions of the beasts, birds and insects it tells of their uses with the cures for various diseases and ailments. Many of the ingredients are slightly horrific and would be hard to come by, but there are practical suggestions as well; for instance, "The louse is a worm of many feet it cometh out of the filthy and in the skin oftentimes and for force of attendance they come out of the skin and the sweat holes. To withdraw them the best is to wash oftentimes and to change oftentimes the linen." The woodcut shows a graphic picture of a young man having his head forcibly deloused by an older woman.

Of the frog "The gall is good to heal a man of worms growing in the body. One that bleedeth staunchess the blood. The frog dressed in oil and salt it is

said it is a true medicine for the leper. The body of the frog that dwelleth under the stone especially the fat of it is very good to make the teeth fall out". Some of the cures are even more nauseating but they are intermingled with strange stories as of the Syren a beautiful lady with two upward curling tails.

"Syren the mermaid is a devilish beast that bringeth a man gladly to death. From the navel up she is a woman with a dreadful face, a long arm and a great body. Is like the eagle in the nether part. Having feet and tallons to tear apart those she getteth. Her tail is scaled like a fish and she singeth a manner of sweet song and therewith deceiveth many a good mariner for when they hear it they fall asleep and then she cometh and draws them out of the ship and teareth them asunder. They have their pages in their arms and give them suck of their paps which be very great. The wary mariner stops their ears when they see her for when she playeth on the water all they be in fear—and let her play until all be passed her. This is specified by all those who have seen her. There is also some places in Araby serpents named Syrens that run faster than a horse and have wings to fly."

How these books must have charmed and filled with wonder an age when books were few and far between, but the *Garden of Health* gave way to a more profound type of medical book concentrating on plants and their curative properties. There was still very little original thinking and each edition was plagiarised from a proceeding one, with the plates used again and again. The heavy wood cuts had given way to finer line drawings. Sometimes a splendid frontispiece was added and a flowery dedication to some noble patron. Care had to be taken not to offend the church and Turner's *Herbal* of 1551 was ordered to be burned. This herbal was more original in thought than many and was produced by a priest of Well's Cathedral. He was a stiff necked chap with ideas in advance of his age and came up against authority. Another of his works was *The hunt of the Roman Fox* which sounds as if it were a racy document. His herbal went into a later edition but even that is hard to come by. Much more popular than Turner was Gerard whose book was revised and re-printed time and time again. The first edition is a lordly tome printed in 1597 and partly translated from an earlier French herbal. Gerard had a large garden in Holborn but professionally describes himself as a chirurgen. He appears to have been ungenerous as a character as he took the translation of Doderen, a friend of his, and published the work as his own without even an acknowledgement; on the other hand at the beginning of his large book are several laudatory poems written in his praise by his friends and admirers One delightful effusion is headed "In commendation of M. John Gerard for his diligence in simpling," by W. W. Westerman. Simpling meaning his expeditions into the country to collect plants. The illustrations are clear and good but the book was full of mistakes, and it is hard to credit that he really believed in the Barnacle Tree. However there is a picture of Barnacles hanging to the tree and a description of how the Barnacles fell into the water and emerged as tiny Barnacle Geese. Those that fell on dry land perished. We might leave this as a legend if Gerard had not emphasised the fact that he had seen these barnacles with feathers beginning to emerge on a log of wood!

Slightly later than Gerard's *Herbal* came that of Parkinson entitled the *Paradisi in Sole* (1629). A delightful book with a splendid frontispiece depicting Adam and Eve in a garden filled with every manner of flower and tree and right

in the centre the small Vegetable Lamb attached by a cord to the ground. This was again a strange conceit that persisted for several hundred years. The lamb was in appearance a true lamb but at the same time was of the vegetable kingdom and attached to the earth. Its cord permitted it to eat the herbage as far as the cord would stretch. With nothing more to eat the lamb withered and died. Wolves were fond of rushing from the mountains and eating the lambs and there was a discussion in the church as to whether the lamb could be eaten in Lent! The whole story probably arose from a traveller to Barbary bringing back a tale of having seen the cotton plant for the first time and describing the cotton as wool as soft as a lamb's and so the marvellous vegetable lamb came into being.

There is one other story that persisted for many years and is illustrated in a number of early books and that is the screaming Mandrake. The Mandrake has an immensely long root which often forks, and in the illustrations it looks very like a little manikin. The story goes that if you must dig up a Mandrake you tied a dog to the root and let him pull it out for if a man did this he would surely die. As the plant left the ground it gave out a fearful and human shriek. Gerard in his *Herbal* pours scorn on these stories as old wives tales, but he takes the trouble to repeat them. He also gives a long list of the cures of which the plant is capable.

We can dismiss these old stories as rather delightful fables, but in the seventeenth century they were firmly believed. So much so that our famous Norfolk Doctor, Sir Thomas Browne (1605-1682) devoted a whole book *Pseudodoxa* or *Vulgar Errors* to the confutation of these myths. With straightforward logic he explodes them one by one. In an age of muddled thinking he stands for progressive ideas and clear thought. He must have been a man of great character as he would not have survived those troubled times, but he did, and Charles II went so far as to give him the order of knighthood.

Another outstanding personality of the same era was John Evelyn (1620-1705) the diarist who published the first book on trees *Sylva or A Discourse on Forest Trees*. This was published in 1664 and is charmingly illustrated with hand coloured engravings. Evelyn was one of the first fellows of the Royal Society and an authority on trees and landscape gardening.

Books were ceasing to follow such a uniform pattern as in the past and a more accurate approach was becoming noticeable. Evelyn died in 1706 and the following year Linnaeus was born and he it was who revolutionised the whole system of plant nomenaclature. Carl Linnaeus, a Swede, and son of a poor parson showed a keen interest in natural history from his earliest years. He refused to follow in his father's footsteps in the church but struggled through the university on a pittance to qualify as a doctor. Always short of money he fought on, teaching and doing medical work when necessary. The rest of the time he worked at collecting and classifying plants producing books and papers on the subject until he was finally recognised and became world famous. After his death his wife sold his books and manuscripts and these were bought by the far sighted Sir James Edward Smith who founded the Linnaean Society in London and became its first president. Linnaeus' influence was immense; he corresponded with all the leading naturalists of his day. His pupils covered the world collecting specimens, and endless books were written describing his sexual system for naming plants. Most of these were delightfully illustrated.

The fashion to publish larger and larger and gloriously illustrated books was beginning. Libraries were accumulating in the big country houses and patrons were ready to sponsor the publications. Sometimes each plate in a book was dedicated by the artist to a patron and his coat of arms might be displayed in a corner. By selling plates in this way the cost of the book was assured. The *Historia Plantorium Rariorum* by J. Martin (1728) was insured in this way, but not all authors had the wisdom or wish to do this.

William Curtis (1740-1799) produced his *Flora Londoniensis* in 1777. A splendid large folio volume of flowers within a ten mile radius of London. It was a lavish book gloriously illustrated with hand coloured plates, but it never paid its way. Curtis turned to producing a magazine with illustrations of flowers brought in from abroad, new species and garden plants. The first number appeared in 1787 and was a success from the start. Curtis remarked that the *Curtis Magazine* brought the pudding and the *Flora Londoniensis* only the praise! Incidentally the magazine is still produced by the Royal Horticultural Society but the hand coloured plates ceased in 1950. From the inception a body of faithful women had hand coloured the plates for a pittance. After the death of Curtis there were a series of editors with famous names: Syms and Hooker and others and a number of well known plant artists.

It was the age of the Elephant Folia, books getting larger and larger so that it was an effort to lift them from the book case to the table. One of these monsters was the *Flora Graecii* by Sibthorpe (1758-1798) in ten volumes but published posthumously. John Sibthorpe, Sherardian Professor at Oxford, travelled to Vienna to study Dioscorides famous codes *Juliana Arnicia*. There he met the Bauer brothers and persuaded Ferdinand to come with him as artist on his further travels to the Levant. Bauer was a consummate artist and not only drew and painted the flora but did many sketches of the countryside. Some of these may be seen as frontispieces to each volume of the flora. Sibthorpe was short lived, he left Bauer to work on the Greek flora and went off on further travels to Egypt. He returned a very sick man and the doctors recommendation of a diet of asses milk and sea bathing at Brighton failed to cure him and he died at thirty eight. Luckily he was not without means and had put away a sum of money to defray the cost of the publication. Only 28 copies of the first edition were printed and sold at £245.00 a set but the cost of the production was £30,000. Sir J. E. Smith and Later John Lindley took over the publishing of the splendid work which appeared between 1806 and 1840.

Meanwhile quite a different type of naturalist was at work and one whose name must be mentioned. Gilbert White lived a quiet peaceful life in his small parish of Selborne. He noted down everything that he saw, recording bird song, the earliest flowers to appear and the arrival and departure of migrants. He kept regular notes over many years but also kept up a vast correspondence. He wrote to relations, friends and acquaintances. Robert Marsham of Stratton Strawless wrote regularly from Norfolk for he too kept careful notes on his observations. It was not until 1798 that a collection of White's letters were published and these proved so popular that innumerable editions followed. There is a charm and simplicity in his writing as he discusses on paper his problems. One of these was the old belief that not all swallows migrated and some dived beneath the waters of ponds and hybernated. Although he died in 1793 the village of Sel-

borne retains much of its peaceful beauty and has become a place of pilgrimage for those who love his simple writing.

John Lindley (1799-1865) the son of a Norfolk gardener became the professor of botany at London University. He wrote numerous books on botany and did much to explode Linnaeus' sexual system which he thought was too arbitary. In a delightful *Ladies Botany* he explains his more natural and flexible system with many first rate illustrations and a few poems:—

> "Queen of the Marsh, imperial Drosera treads
> Rush-fringed banks and moss embroidered beds."

The female sex was considered but talked down to! His chief works were *The Vegetable Kingdom* and *Genera and Species of Orchids*. For years he was secretary to the Royal Horticultural Society and his library presented to them will always be his memorial.

Flower books with all their size and magnificent presentation were almost superceded by the vastness of the folios on birds. The great age for bird books was later than for botanical books, probably because of the difficulty of obtaining specimens. John Gould (1804-1881) is one of the greatest names with his enormous folio volumes, *Birds of Europe*, *Birds of Australia*, *Mammals of Australia* and *British Birds*. His home and studio was in Charlotte Street, just off Piccadilly and there there was always a scene of hectic industry. Birds skins arrived from all over the world. Gould drew the outline for the plates and Hart made the blocks and coloured in the metallic parts of the humming birds. Besides this there was a large team of artists who finished off the plates and put in the final colouring. Even Mrs. Gould was called in to assist. The house was always in chaos, stacked with books, papers, drawings and bird skins. Artists came and went and even the famous Edward Lear of the Nonsense rhymes worked for a time in Gould's studio. After Gould's death Mrs. Gould sold the remainder of all his works to the publishers and waggon after waggon took away tons of material.

John Audubon (d 1851) an American of French parentage, lived at almost the same time as Gould and published *Birds of America*. Subscriptions for his great work were raised in England and his book published over here. There is more interest in his plates than in those of Gould for each picture has a background of the bird's habitat, whereas in Gould the birds sit on bare branches or perch on rocks.

Buller's very popular *Birds of New Zealand* were in more manageable a size as was also Bewick's *History of British Birds*, but the fashion for enormous volumes still persisted and Elliot published a monograph *Phasianidae* in 1870. There was too a magnificent book on *The Birds of Paradise*, and although the production was large yet each plate had to be folded in two to get in the stupendous tails! The proud owners of these lovely books must have had to have shelves especially constructed to house them, but it was the age of lavish books of all kinds with portfolios of sketches and there was leisure too in the evenings to examine them.

One of the most famous of botanical books goes under the name of Sowerby and was published between 1757 and 1782. In fact it was written by that most generous and far sighted of men Sir James Edward Smith. Most people who write a book take the credit for it and the artist who does the drawings' name appears in small type. With Smith it was the other way round and he handed all the glory to Sowerby. Sowerby was one of a brilliant family of artists and his *British Botany* was deservedly popular. Each plate is partially coloured by hand. The fashion was coming in for line drawings of flowers, which the owner of the book could colour when he or she found the plant. This pleasant practice has continued to the present time, and, Stella Ross Craig's *Drawings of British plants* that has been coming out for the last twenty years, is printed on the best drawing paper for this very purpose.

To go back to Sir James Smith, it is good to remember that he was a native of Norfolk and practiced as a doctor in Norwich. He had a tremendous influence on most of the major books of this era. He died in 1828.

From the mid nineteenth century works on Natural History poured from the printing presses. The approach had become slightly sentimental with pious thoughts on religion. There is a nostalgic charm about these pretty books but none more so than Noel Humphreys' *Butterflies and Moths* circa 1865. Each plate would make a picture on its own with its charming composition of flowers and branches interspersed with butterflies or moths with their caterpillars on their correct host plant.

The era for collections had started and little parties trailed along the sea shore gathering sea weeds to be floated onto paper and stuck into albums. Every house had its collection of butterflies and bird's eggs. Parties of ladies led by some knowledgeable cleric toured the countryside for flowers using as their guide the flower book known as "Bentham and Hooker" (*The Handbook of British Flora*) and clearly illustrated by that superb botanical artist W. H. Fitch (1865).

In 1859 Charles Darwin published *The Origin of the Species*, and then the whole world went up in flames of horror. It was such a new concept and appeared to deny the infallible teaching of the Old Testament. In general the country was scandalised although many scientists had been gradually coming to similar conclusions. The church took a heavy stand against such infamy and for the next decade books poured out on Darwin and his theory.

During the early parts of the twentieth century books have been cheap and plentiful, but finely illustrated books have still been published. There are Fryer's *Potomagetons* with illustrations by Robert Morgan in 1915 which captures the translucent quality of the leaves. A limited edition of *Orchids* by Gavin Bone,

the printing so good that each specimen appears to have been drawn by hand. There are still many fine artists working on plants such as Stella Ross Craig. Long may they continue for we are coming to the era of coloured photographs. Some of these are very lovely and one must not discount their appeal. Everything has speeded up and looking back on the last thousand years of slow progress one can only imagine that the future will hold books written on tapes with pictures projected on to a screen.

Illustrations : "of the tode" and "Syrene the Mermayde" taken from *Hortus Sanitatus*.

NORFOLK WEATHER 1778-1802 AS RECORDED BY REVEREND JAMES WOODFORDE

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Parson Woodforde's diary in its edited form (Beresford 1968) provides a wealth of detail on life and conditions in the second half of the eighteenth century. For the second half of the period it covers, the entries refer to Weston Longeville, north-west of Norwich, where Woodforde was the rector. This discussion is focused on the weather data that can be assembled from the diary. The period, 1778-1802, covers an interesting part of the eighteenth century which in several respects experienced meteorological conditions different from those of the twentieth century or indeed from earlier parts of the eighteenth century.

Woodforde was not a scientific meteorologist even in an amateur sense. Unlike a number of his clerical, medical or land-owning contemporaries, he did not set out to maintain an organised weather record. His diary includes frequent references to the weather, but the entries reflect mainly extremes of favourable or unpleasant conditions. In the edited form of the diary it is impossible to derive a statistical statement of the frequency of specified weather phenomena. In the second half of the eighteenth century a number of keen weather observers, for example Thomas Barker of Rutland (Manley 1952) or William Borlase near Penzance (Oliver 1969) stimulated by the current interest of the Royal Society in a more scientific treatment of weather recording, developed not only a more consistent recording format but also attempted to supplement their own impressions by establishing some elementary instrumentation. Barometers, thermometers, wind vanes and rain gauges, the form of instruments then mostly in use, lacked standardisation, were not very accurate and often were relatively insensitive. Their exposure and installation varied considerably and comparative studies of the data are often precluded.

In 1780 Woodforde obtained a barometer and thermometer from an Italian, Padralio, in Norwich. From time to time he recorded the atmospheric pressure, but the readings were unduly low and the barometer was clearly faulty. His thermometer was set up indoors in a room heated by a fire. It registered excessively high values on warm sunny, summer days, which suggest that, at times, it was exposed to the direct rays of the sun through a window. He also set up a weather cock in his garden. Perhaps it was more of a status object than a scientific aid since he was struck "by the very good effect it has there (in his garden) . . . looks very well indeed and handsome. The Pole painted a dark green and the Weathercock black and gold." Though it was initially installed in the midst of a clump of firs, he did something to improve its exposure by cutting down a hedge and some of the firs in the plantation. He made little apparent use of it, however, for his diary entries. When he recorded wind directions it was mainly to point out periods of winds persistently from a given quarter, especially easterly, which dominated the weather.

The diary entries available do not permit the reconstruction of the daily weather sequence since many of the less extreme and more routine events are not recorded. For this type of analysis other eighteenth century instrumental records combined with descriptive, but specifically weather diaries are more

helpful. However, such records include features which are peculiar to the recorder's location and the network of observers is thin and poorly distributed. It was not until the last thirty years or so of the nineteenth century that an official, standardised and more comprehensive recording network in the British Isles became available. In the interim, information such as that which can be gleaned from Woodforde's diary, has enhanced value. Available records have to be evaluated according to their location on the western or eastern seaboards, in central inland areas, or in the extreme north or south. The very nature of atmospheric dynamics produces sharp contrasts between the Atlantic facing and the European mainland oriented parts of the British Isles.

Parson Woodforde's location in East Anglia, where no significant topographic shelter from the north or the east occurs, means that his diary provides weather data for a part of England for which details are lacking at that time. In addition, like many diarists of his time, he was concerned with gardening and farming. He had, therefore, a strong interest in the effects of the vicissitudes of the weather on such weather sensitive activities. Through his comments upon the harvest and other agricultural conditions it is possible to derive interesting local information on the state of the farming economy in Norfolk.

East Anglia is particularly exposed to air-streams from between south-east and north. In winter such air can be severely cold and persistent when an anticyclonic centre is to the north-west, north or east. Though in winter the North Sea can cause a slight warming and humidifying of cold easterly continental air, the lack of high ground in East Anglia means that the speed of winds off the sea is little reduced. The increase in moisture and slight instability in such air, however, is often conducive to snow showers. Norfolk has a relatively high expectation of snow fall.

This same eastern seabord location can be advantageous in summer if the main sequence of weather systems is from west to east across Britain. The East Anglian summers are often then drier and sunnier. Summer and often spring anticyclones can produce fine and favourable spells of weather provided conditions do not get too dry. Thus over the years of the diary there appear from time to time entries indicating periods of excellent growing conditions and fine harvests.

To some degree a chronological treatment is unavoidable but the aim of this study has been mainly to single out Woodforde's impressions respectively on the coldness of winter and spring, the occurrence of hot summers, the variations in the harvest and the spells of drought or excessive wetness.

The coldness of winter and spring

A valuable standard by which to judge the relative temperatures of each month since 1698 has been provided by overlapping a number of records all from a fairly small area referred to as Central England (Manley 1953). This has recently been brought up to 1970 (Davis 1972) and the monthly values have been grouped into quintiles (twenty per cent groups). These groups, indicated by index numbers, are listed, for 1778-1802, in table 1 with the coldest and next coldest being identified as 1 and 2 respectively, the warmest and next warmest by 5 and 4. Over the years covered by Woodforde's diary, there is a greater frequency than normal expectations (based on a 273 year record) would suggest of cold months

during the September to April part of the year and of warm months in the March to September parts of the year. The greatest positive departures in the decadal monthly means were for June to August, whilst the largest negative departures were for October to January and March. Winters were colder and summers warmer than the long period pattern.

TABLE 1.

Monthly temperature quintiles for Central England for 1778 - 1802 According to N. E. Davis (Davis 1972)

1 *represents the coldest and* 5 *the warmest quintile.*

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC
1778	2	2	2	3	2	5	5	5	1	1	3	5
1779	3	5	5	5	4	3	5	5	5	5	3	2
1780	1	1	5	1	5	3	4	5	5	2	1	2
1781	2	4	4	5	4	5	5	5	4	5	4	4
1782	5	1	2	1	1	4	3	1	3	1	1	2
1783	3	2	1	5	2	4	5	4	2	3	3	1
1784	1	1	1	1	5	2	2	1	5	1	2	1
1785	3	1	1	4	5	5	4	1	3	2	2	2
1786	2	2	1	3	3	5	1	2	1	1	1	2
1787	3	5	5	2	4	2	3	3	2	3	1	3
1788	4	3	1	5	5	5	3	4	3	3	3	1
1789	1	4	1	2	5	2	2	5	3	2	1	5
1790	4	5	4	1	4	4	1	3	1	4	3	3
1791	4	4	4	5	2	4	2	4	4	2	3	1
1792	2	3	4	5	1	1	2	5	1	2	5	3
1793	2	4	2	1	3	2	5	2	1	5	3	4
1794	2	5	5	5	3	5	5	3	2	3	3	3
1795	1	1	1	3	3	1	2	5	5	5	1	5
1796	5	4	2	5	2	2	1	4	5	1	1	1
1797	3	4	2	2	3	2	5	4	2	1	1	4
1798	3	3	3	5	5	5	4	4	3	4	1	1
1799	2	2	1	1	1	3	2	1	2	1	2	1
1800	2	1	2	5	5	2	5	5	4	2	2	2
1801	4	4	5	3	4	4	4	5	4	4	2	1
1802	1	3	3	4	2	2	1	5	4	4	2	2
Months in coldest quintile												
	5	6	8	6	3	2	4	4	5	7	9	8
									22 *per cent of the total*			
Months in warmest quintile												
	2	4	5	10	7	7	8	10	5	4	1	3
									22 *per cent of the tota*			

On the whole the picture presented by the diary is, as would be expected, in accordance with the Central England record. Anticyclones centred over Central England might be expected to affect East Anglia rather similarly. Persistent cyclonic conditions would also tend to give both areas a similar weather pattern. The most likely discrepancies would arise when continental European or Arctic (more especially in winter) air-masses are advected into East Anglia. Pressure systems centred, so that east and south-east or northerly air-streams develop, can give East Anglia weather spells contrasting with western or central parts of England.

Inevitably it was the periods of extreme cold and discomfort that Woodforde singled out for comment in his diary. Departures from normal were greatest in the winter months. Observations upon winter or spring cold make up by far the largest proportion of his weather comments. Table 2 assembles the number of occasions on which different categories of weather received a diary entry. Such a tabulation has limited accuracy because of the tendency to record the extremes rather than every event, by the fact that less drastic instances at night are likely to escape attention and because of a more incomplete overall record in the earlier years of the diary. For instance, up to 1781 the weather entries were particularly spasmodic. The information presented enables some comparative relative study to be made of the years covered by the diary, but does not permit precise absolute comparisons to be made with present day records. For example his snow fall entries are much below the more precise present day records.

TABLE 2

Daily Occurrences of specified weather conditions at Weston Longville

	1782	1783	1748	1785	1786	1787	1788	1789	1790	1791	1792
Severe outdoor frost	2	6	9	13	4	2	4	5	0	11	12
Freezing indoors	0	0	0	2	3	0	3	4	0	1	5
Snow fall	5	4	8	5	3	2	5	2	1	5	5
Thunder	0*	3	2	3	0*	4	3	0*	5	4	1

	1793	1794	1795	1796	1797	1798	1799	1800	1801	1802
Severe outdoor frost	8	6	33	14	9	15	32	12	6	6
Freezing indoors	0	3	10	5	0	5	12	2	2	3
Snow fall	3	3	11	6	1	4	22	2	7	9
Thunder	0	1	0*	1	6	5	2	1	7	1*

**No details because of absence, etc.:* 1782 29 *May to October;* 1786 23 *June to* 13 *October;* 1789 15 *June to* 8 *September;* 1793 8 *July to October;* 1795 24 *June to* 4 *November and* 1802 2 *October to* 31 *December.*

Earliest outdoor frost 22 *September* 1796*; latest outdoor frost* 19 *May* 1782. *Earliest snow fell* 25 *November* 1795*; latest snow fall* 16 *May* 1802.

Although there was an evening snow fall on 1 January 1782, it was not until 29 January, "bitter cold" with windy, frosty conditions that there was a hint of further cold. January was a month of mild, westerly weather generally in England. Pressure was high in February in Norfolk and the first part of the month at least appears to have been cold, and there was deep snow on 12 February. March also seemed to be cold with a very cold windy and snowy day on 22 March. April drew more comment for wetness. The spring of 1782 was terminated by a sharp late frost and very cold night on 19 May.

The first day of 1783 also opened with cold winds, frost and snow, but apart from indicating a wet early February, the entries in the diary do not indicate cold until the severe frost of 26 February, the "coldest Day this Year or last". Snow fell heavily in the morning. After severe cold on the first five days of March,

the spring seems to have improved considerably so that, because of the more favourable weather, the demand for turnips for fodder slackened and they were hard to sell.

The cold of the 1783/84 winter persisted from 28 December, when it was both snowy and frosty, until 2 April 1784 when, despite snow all the afternoon, it was "much milder to-day than it has been of late." On that date Woodforde recorded, "The Land has not been free of Snow since 23 of December last." At least there were falls of snow on 21 and 22 January, 7 February and 30 March 1784. The fall of 7 February was such that in places the snow was "almost up to the Horses Shoulders", the road to King's Lynn was almost impassable, whilst in Norwich the streets and market place were "nothing but Ice." Not surprisingly (8 February) the Cathedral congregation was limited by the cold. Owing to the severe winter Woodforde recorded (2 April), "Many Farmers are now greatly distressed for their Stock and some obliged to slay them half fat, on Account of the Scarcity of Provision for them. The Turnips rot very fast of late. I never knew so severe or so long a Winter as this has turned out." The Overseers of the Poor asked Woodforde for subscriptions for the poor "during this severe Weather".

The last three months of 1784 in Central England had temperatures much below average. The diary evidence is limited to references to the cold, rainy 17 November, the hard frost of the night of 9 December and to the entry indicating on 27 December the road difficulties from frost and snow. The cold extended into the earlier days of January, even though it was possible to describe 23 January as "quite a Summers Day." Westerly winds were weakly represented over Britain in January 1785. February was cold at Weston Longeville. Despite bright sunshine in the day, it froze sharply indoors the night of 19/20 February after a frosty preceeding four days. On the night of 27/28 February "it froze the Chamber Pots under the Beds" after a day of freezing winds but sunshine. Further entries indicating cold or snow continue to 27 March when there was snow and a sharp frost by early evening. However, spring was close and 5 April was a "very fair and fine Day throughout—quite warm."

A number of Christmases in the period of the diary were cold, and 1785 was no exception. 24 December 1785 had a stormy E.N.E. wind with a very sharp frost and Christmas Day itself was "excessive cold with Snow and Frost also." The cold continued at least to 18 January 1786 with considerable snow. Divine service (8 January) was impossible with snow impeding movement, the country lanes being impassable. The doctor crossed the hedges on the snow (9 January). Woodforde made no comment about conditions in February, but on 6 March he noted, "the cold more severe and penetrating than any yet, it freezes within doors in less than 10 minutes". In his study, where there was a fire, the temperature was 50°F at 10 a.m. (cf. 56°F at 11 a.m., 20 February 1784). March 1785 for Central England was the coldest experienced 1697 to the present. Cold conditions appeared to persist until 10 April, when in the morning ice a half inch thick had formed on a water tub outside the house.

The 1786 Christmas was also cold and had been preceded by a considerable snow fall on 23 December. In Central England the autumns of 1740 and 1786 are the coldest recorded. After a severe night frost Woodforde noted on the morning of 26 December that water brought upstairs for washing froze over in half an hour. He recorded little other detail on cold weather in January, except for a

frost on 18 January and cutting winds and considerable snow on 28 January. February appears to have enjoyed the mildness indicated in Central England. On 1 February the diary entry reads, "Yesterday and to-day were so warm and lively that it had more appearance of Summer than Winter." With some foreboding (not justified by subsequent weather) he quoted the local belief that fine winter days were "Weather breeders—producing bad Weather." Cold sleet on 5 March and a dry cold N.N.E. wind on 18 April did not counteract the impression that neither winter nor spring in 1787 were severe. Indeed the fine February reduced the demand for fodder and the price of turnips declined sharply.

The 1787/88 winter was also mild. The only references he made to cold were the snowy 14 January and the clear, cold, 11 March. The first two months of 1788 were more remarkable for their wetness. We read the entry on 1 March, "I never knew the Lands so wet as they appear now". The weather of mid-March displeased him, "The late cold Easterly Winds which we have had, and still prevail, great unhinge my animal Frame." (16 March). The next day was similar and water froze upstairs in the house. 23 March was a "thoroughly winterly day long . . . " Like other parts of England, March seems to have been fairly cold in East Anglia.

December 1788 was cold and introduced the much colder 1788/89 winter. Considerable snow fell on 3 December, and by 12 December, Woodforde was referring to the hard frosty weather. On 15 December he wrote. "Weather so extremely severe . . . It was agreed by almost all that this Day was one of the coldest that ever was felt. The wind so high and the frost so intense . . . " The cold persisted. The entry for 31 December read, "The coldest night I ever felt (I think) in my life and the morning also the coldest with high wind and small snow. It froze and still freezes sharply almost in every place in my house." The thermometer in his study, where there was a fire, descended to 46°F in the morning. The cold continued into January 1789. The pressure was high, the freezing winds strong and indoor frost prevailed. Freezing rain fell on 13 January, a day with . . . the weather if anything more severe and Frost sharper with strong Wind than any Day yet this Winter—bitter, bitter cold." After some relief in February the cold returned in March, delaying the spring growth of plants and causing a strong rise in the price of turnips. Even as late as the 17 April Woodforde wrote that, "the Weather has been of late uncommonly severe for the Season", and on 11 May he observed that the spring was very backward.

The 1790 and 1791 winters were not cold. Westerly winds in Britain were strong in the Januaries of both years (Lamb and Johnson 1966). Christmas Day 1789 in Norfolk was a remarkable fine mild Day." On 14 January 1790, Woodforde noted, "The Season so remarkably mild and warm that my Brother gathered the morning in my Garden some full blown Primroses." In February comments on the fine, warm weather predominate and there were no details of frost or snow. March seems to have been similar, but on 10 April, Woodforde was complaining still of the cold, strong, dry, east winds that had set in on 1 April. Conditions seemed to have ameliorated thereafter.

Though early snow fell on 30 November 1790, the Christmas period was mild and wet. January 1791 the weather was unsettled and pressures were low (he remarked upon this on 4, 18 and 19 January). The night 1/2 February was stormy with a cold north-west wind, snow and hail. The next two days seemed

to have been similar. 27 February was cold, wet and windy, but otherwise the rest of the winter and spring experienced no severe frost or snow. On 14 March he was busy making the hot bed for his cucumbers (one day earlier than in 1790). On 19 March he complained of the glut of turnips in most parts of Norfolk, "The Winter turning out also so remarkably mild", so that with the prevailing fine weather most of the turnips "are now given away to feed them off". By 12 April people were even offering money to those who would feed the turnips off, whilst many threw them away into the ditches (15 April). April had very pleasant weather and Woodforde remarked (24 April), "Never a fairer Season known than the present" and again on 9 May, "Very fine pleasant spring weather." In Central England, May was much cooler than average, but Woodforde's diary gives no hint of this except perhaps that his first sighting of a swallow (3 May) was the latest he observed, except after the very cold winter and spring of 1799. His first crop of peas was picked in the garden on 5 June (cf. 30 May 1797 and 27 May 1794, both very early seasons).

One of the earliest frosts he recorded was on 25 October 1791 when ice formed "near half inch thick". Very cold weather with strong easterly winds on 1 and 2 November followed. December 1791 was a cold month. A cold wind and a frost occurred on 8 December. The ensuing days were cold with a good deal of snow on 10 December, and on the next day with a northerly wind . . . it froze all day long even within doors very quick . . . It froze the Cream and Milk in my Dairy very soon." On 12 December his study thermometer descended to 42°F at 9 a.m. The cold persisted until 26 December, and he complained of the icy conditions under foot. After a brief return to milder weather in early January, by 11 January 1792 he was recording freezing conditions indoors. Still on 14 January he wrote, "The most severe Frost last Night and this Morning as I ever felt. The Milk in the Dairy in the Pans was one Piece of Ice and the Water above Stairs in the Basins froze in a few minutes after being put there this Morn. I don't know that I ever perceived the cold as piercing as this Morning (his weather recollections seem to have been short-lived) have kept a Charcol Fire in my Cellar since we brewed." The first half of February seems to have been less cold, but by 16 February he was recording cold weather with hail and snow, whilst on 18 February there was severe frost outdoors and inside and it snowed all day with a strong wind. Severe frost occurred on 20 and 21 February, but with fine weather on 27 February, perhaps believing the worst of the winter past, Woodforde uncovered his fig trees. Nevertheless 8 and 19 March were very cold, and on 10 March it snowed morning and afternoon so that the snow lay on the ground the next day which had a cold north-east wind. By 21 March his wall apricot trees were "much hurt by the Frost and cold Winds. Their Blossoms appear to by burnt up." April was then apparently frost-free and on 13 April he wrote, "Quite Summerlike Weather". He found it cold on 23 May however, and so cold and cloudy on 21 June that he had a fire in his study.

Woodforde had little say about weather in November and December 1792. On 17 November a sharp frost produced ice half an inch thick, there was frost with a north-west wind on 7 December and windy, snowy weather on 23 December. A few individual cold days were mentioned in January and February 1793, but the main cold of the winter was associated with easterly winds experienced briefly on 10 March and then in the last week of the month which was frosty and dry. His pond froze "all over and thick." (29 March). Easterly, and sometimes

north-easterly winds prevailed throughout April until 22nd with snow on 17 and 19 April. His first sighting, however, of a swallow (17 April) was one of the earliest of any of his recordings.

No frost or snow were recorded in December 1793, but January 1794 cooled down from the start of the month. By 12 January "Almost all People (were) complaining of the cold." 25 January was windy and snowy, and on 27 January, with freezing indoors and small snow outside, he remarked, "The present severe cold Weather pinches me greatly." He recorded on 28 January that two women returning home from Norwich market had been frozen to death. After a freezing day outdoors on 30 January it became thereafter much milder and often wet. Generally in England, February was very mild. He made several entries concerning the pleasant weather, and on 27 April wrote, "Most delightful Weather indeed. Everybody very forward in the Garden, Goosberries fit for Tarts." Peas were picked on 27 May, strawberries on 1 June and his first cucumber on 2 June.

Although a slight frost had occurred 8 November 1794, Woodforde commented on the mildness of the season (25 November), and it was not until 24 December that it was freezing indoors and out with a strong easterly wind. With the added hardship of deep snow on Christmas Day there were very few communicants at church. January 1795 in Central England was the coldest recorded to date since 1698. East Anglia did not escape its severity. Winds in eastern Britain were from between S.E. and N.E. On 3 January Woodforde remarked, "The Air I think was never more cutting than to-day tho' quite a calm. It froze all the Milk in the Dairy." The barometric pressure was high, whilst his thermometer fell below 40°F on 4 January. The next day saw a slight let up but it was frosty again by 10 January and, apart from brief thaws, the cold persisted until 17 March. An easterly wind accompanied the cold in the third week of January. Snow showers occurred in January but the weather was more remarkable for severe frost than snow. On 20 January the milk in the pans froze solid, "The coldest day I ever felt in my life." The cold continued and on 23 January was "more severe than ever, it froze apples within doors tho' covered with thick carpet." On the 25 January his thermometer was again below 40°F and we read the entry, "the Frost more severe this Morning than Yesterday. It froze the Chamber Pots above Stairs." The intensity of the cold prevented the church service. Ice two inches thick formed on the pond despite being broken every morning. "A great Thawe, air quite mild without" (with lowered barometric pressure as well) produced flooding on 27 January, but the respite was very brief and the cold returned the next day when it snowed all day with a driving wind. So it went on with further snow and severe frost, as Woodforde put it (3 February), "this Cold dreary Lapland Weather continues which at present seems more likely to continue than alter." He noted that many birds had been killed by the frost (4 February) and that crows and rooks came up to the kitchen door to feed with the chicken. A temporary thaw on 11 February, with a fall in pressure and slight rain all day, produced a great amount of melt water and high water levels in the ditches and in his well. High floods due to melting snow occurred elsewhere in Britain at the time. By 18 February, however, there was black frost and a strong east wind, "as cold this day almost as any this winter." The vegetables were badly frosted. A sum of £46.15.0 was subscribed to buy coal and bread for the poor of Weston Longeville. Snow fell 19, 20 and 22 February,

and the piercing east wind accentuated the cold so that it froze hard indoors. It was with relief that he wrote 26 February, "Quite a pleasant warm Day", but the weather pattern had not changed, and by 28 February, with frost and snow, he commented, "Another kind of Winter come again upon us." It was not until after 19 March that the cold relented. Snow had fallen all day on 28 February and during the night 12/13 March (a day he described as a fourth winter). On 14 March it melted and by 17 March caused flooding with the ditches overflowing, his farm yard was almost covered by water and the "Land Springs . . . scarce ever known to be so full as at present." After the preceding March it is not surprising to see the entry of 24 April, "Spring still backward and Air quite stingy". The mildness of the 1795/96 winter contrasted strongly with the previous year. Whilst visiting Castle Cary in Somerset he noted early frosts on the night 22/23 October and 3/4 November. In Norfolk there were frosts 20/21, 21/22 and 26/27 November, but this early pattern did not persist and December was not cold. Indeed he noted 22 December "remarkably warm" and Christmas Day "turned out a very fine Day indeed, no frost." No mention of snow or frost appears until 6 March 1796. January 1796 was a very mild month in England generally. On 12 January he wrote "very mild indeed for the Season", on 17 January, "A summer like day quite warm and sunshine. Uncommonly fine for Season" and on 21 January, "Most delightful Weather for the Season." Incidentally his thermometer read 78°F and 90°F respectively for 12 and 17 January and clearly must have been exposed to direct sunshine. March was a colder month. Snow fell for most of the morning of 6 March, the whole day was cold and at night it froze indoors. Cold weather was recorded on 8 March (with a cold E.N.E. wind); and there were frequent snow and hail showers on 27 March, the worst Easter-day he could recall. The cold of March extended until April, and his entry for 11 April was, "Very cold barren growless Weather still" (apparently at variance with Central England experience). However by 1 May he wrote "All Vegetation seems at the height of growing."

In Central England the months October to December 1796, the last month especially, were all below the long-period monthly averages. Woodforde's diary provides little comparative detail. However, the earliest frost he ever recorded occurred on 22 September and other frosts occurred 6 November and 29 November (with a little snow in the evening). There was a very cold day on 1 December with deep drifted snow. The cold lasted with little break until 30 December when it became mild, overcast and damp. On 3 December the milk froze in the Dairy and the washing water above stairs. It was still freezing indoors on 4 and 6 December. A brief thaw on the evening of 7 December followed by a sharp night frost "made the whole land a continuous Sheet of Ice, but fortunately about 11 this morning (8 December) it snowed so as to cover the Ice but did not continue long." He noted the rising barometer and falling thermometer and predicted the cold was likely to last. "A very cold raw Thawe" (12 December) did not upset his forecast. 24, 25 and 26 December were freezing indoors and out. He recorded 26 December, "amazingly cold and hard Frost with rough E. wind all day long colder than ever". January and February 1797 apparently had a normal degree of cold with hard frost 13 and 25 January and 18, 19 and 27 February, but the winter generally was not unduly cold. Vegetation was backward (18 February), and on 11 March he wrote, "No appearance at all scarce to be seen of a near approaching Spring. Nothing grows." A cold north-east wind from 11-19 March delayed spring growth. North-east winds in April (recorded 10,

20, 21 April) gave cold days and must have limited growth. There was a hard frost on 20 April. The early part of May was apparently little better. The evening 1 May was very cold, 4 May was " . . . More like February than May" with a high wind, 8 May "very severe cold weather for May" and 10 May, "Uncommon cold windy with much Rain all day." By 11 May it was wet but much milder and the overall temperature for the month was probably about normal.

In 1797 the winter commenced with frost on 24 November, a cold very snowy day on 29 November and a "smart frost" on 3 December. However, the rest of December brought no comment about cold weather, rather it seemed to be very fine, at least in the second half. He recorded four frosts in January and two other cold days but neither that month, nor February and March appeared as cold months. High barometric pressure in mid-February was not accompanied by cold and only one frost was recorded in February and one in March (11/12). London experienced S.S.E. resultant winds during the 1797/98 winter. On 11 February he remarked, "Very fine Weather indeed for the Season", and on 6 March, "Weather very fine for the Season and has been remarkably mild the last five Months. Very little severe Weather the whole Winter as yet." Snow fell on 11 and 31 March and hail on 17 March, but the month was not severe. Following a sharp frost 1 April there were no entries of cold for that month. A warm April 1798 was experienced in Lancashire (Manley 1953). The date of the first sighting of a swallow (15 April) was the earliest he recorded in his diary.

The 1798/99 winter reversed the pattern and was notable over the British Isles for its snowiness and persistent severe cold. (Jones 1953, Manley 1954). The diary demonstrates that East Anglia was similar. The cold began with a severe frost on 17 November 1798 giving quite a thick ice cover on his pond, and hard frost and snow on 25 November. By 13 December a strong easterly wind was giving cold weather with freezing conditions indoors. Christmas Day was cold with some snow and the last few days of December were very cold. The entry for 26 December noted "we have not had so severe cold Weather as we now have for many Years past. The cold indoors on 27 December, "I can scarce live in it." On 28 December he was complaining of everything freezing indoors. "Meat like blocks of Wood. It froze in the Kitchen even by the fire in a very few Minutes. So severe Weather I think I never felt before. Even the Meat in our Pantry all froze and also our Bread. I think the cold was never more severe in my life."

The cold continued until 7 January 1799. Though relenting apparently thereafter, he found a number of the January days cold, whilst from 28 January until a thaw on 9 February another bitter spell of weather ensued, with heavy snow on the night 27/28 January, and on 1 February a "rough" easterly wind, "By much the coldest and most severe Day we have had as yet during the Winter (it cannot be compared in absolute terms with the cold of 28 December 1798). The present severe weather pinches me almost to death." The turnips were frozen so hard they had to be split with wedges and mallets and all the tops were frosted off. Drifting snow made the roads impassable. Perhaps forgetting the January of 1795, he wrote on 2 February, "Scarce ever known such severe Weather for the last 60 years." He compared the frost with the thirteen week frost of the 1740 severe winter. 3 February received a great fall of snow during

the preceding night and then all day. Drifts in many roads up to 15 feet deep developed, "It is dangerous for almost any person to be out." People were walking in the snow across the hedge tops. Cattle were starving because the frozen turnips could not be used. Woodforde wrote on 3 February, "If the present severe Weather continues God only knows what we shall all do, and again on 4 February, "Dreadful Weather for the poor people now." Snow also fell on 4 February which was a day when people in the area were digging themselves out and road clearing, "All travelling almost to a Stand." Although more snow fell on 5 and 6 February, the packing down of the earlier snow was making the roads more passable. Snow fell also on 7 February, which was so cold that "water froze in the backhouse quite hard within less than 4 hours after it had been brought from the well to-day abt. Noon." There were fears that coal in Norwich might be short since barges were "all bound fast by the Frost in the River and unable to get from Yarmouth." After more driving snow on the morning of 9 February, it "came on a gentle Thawe all of a sudden which made us rejoice." In the following days thaw and cold fluctuated. The snow showers on the mornings of 13 and 14 February quickly melted in the afternoon. The improvement was slow. However, Woodforde summed up the situation on 17 February, "Very dismal Account, on the Papers respecting the last severe Weather—many many people having lost their lives thro' the inclemency of the same . . . The Roads in very very many Places impassable. The long continuance of so severe cold Weather having scarce been ever known for the last Century. It has lasted now (with scarce any intermission) from 17th of December (cf. his earlier diary entries) last past and still likely." It snowed much of 18 February, but the next day was mild, fine and dry and this pattern continued until the end of the month. He wrote on 20 February "this Day throughout having given us great hopes of a happy Change." Snow melt waters and heavy rain on the night 21/22 February caused considerable surface flooding. From 28 January to 18 February snow, mostly heavy, was recorded on 13 days.

Woodforde recorded some of the consequences of the severe winter of 1799, "Almost everything in our little Greenhouse killed . . . " (28 February), and "Gardening very backward indeed, nothing in short shows any sign of Vegetation whatever. Our Apricot Tree—which used to be out in full blossom in February—has scarce any appearance of bloome yet. So backward is everything in the Vegetable State." (5 March). The prospect of relief from the cold was short-lived however. Temperatures dropped again by 7 March when snow, with other falls on 9 and 15 March, occured. He observed on 15 March, "Vegetation seems almost at a Stand . . . many turnips killed . . . A smart Frost again this Evening. So long a Continuance of cold scarce ever known." On 20 March his entry was, "The cold and severe Weather with daily Frosts and cold Winds from N.E.N. (six) still continue . . . No flowers whatever but Crocus's and Snowdrops to be seen and they not above half open and even few of them. Beans and Peas scarce out of Ground yet and what do appear above Ground very Yellow and Sickly." He still referred to snow and very cold weather on 29 March adding, "What a dreadful cold Winter have we had and so very long and still continues on. By much the coldest and largest Winter I ever knew yet." With a cutting E.N.E. wind on 30 March, it was freezing indoors during the morning, and he speculated whether the morning and the day "have not been as cold and severe as any this Year yet."

There seemed to be no let up. On 2 April he complained of the death of plants in the garden, "What a dismal, dreary Aspect have we at present." Stock were suffering from the scarcity of fodder. The diary entries continue in the same vein. On 4 April there was a freezing wind and his pond was covered with ice all day, "altho' we had some sun . . . All kinds of Garden Stuff, except Potatoes that have been well covered and in the ground are almost all gone dead." The potatoes that had been dug up and stored in the house had been ruined by the frost. Some improvement occurred on 6 April, but much the same cold, damp and "very dirty" weather continued until 10 April which he found a little warmer. Though he wrote on 13 April, "I am in great hopes now of our soon enjoying more pleasant Weather and warmer . . . " it did not warm significantly until 19 April, the wind having been in the easterly quarter" for a long very long time" (16 April). Heavy rain (19 April) made it so that ploughing for the barley crop was impeded the next day, and on 21 April he wrote, "Pray God! send us more favourable Weather." The first half of May remained cold. One of his neighbours was "greatly distressed for Food for his Sheep and Cattle, the Season continues very cold and wet that Nothing scarce grows yet. No Hay almost to be got for Love or Money." (6 May) and even on 23 May, a cold windy day, "the vegetation (was) very sluggish."

The sequence of months November 1798 to May 1800, except June 1799, were all to a greater or lesser degree below the 1698-1950 average in Central England. Woodforde frequently reported cold conditions in East Anglia even in June 1799. On 13 June he observed, "Very little Sunshine indeed for the Season. Grass for Cattle very scarce and very short. It is dry, but a cold N.N.E. wind prevails much. All kinds of vegetables very scarce and dear. Our Peas are just now in bloom. Scarce ever known so late a Season for things." Much the same cold sunless weather persisted until 17 June, and on this day and on 23 June because of the cold he had a fire in his study.

Though not a mild winter 1799/1800 was vastly better than that of the preceding year. There was little mention of cold in October, November or until 18 December when the first snow was recorded. Considerable snow fell on 19 December, it was freezing indoors on Christmas Day, with hard frost and snow showers on the next day. Fortunately the snow cover protected the growing winter wheat from frost damage. The pond froze sufficiently on 31 December to bear a person's weight. 1 January was freezing indoors, but January and February were not severely cold. 17 January "a fine day indeed for the Season" caused him to comment, "I hope it is not a Weather breeder as it (a fine winter's day) is called here." There was a mild break at the end of January. The second half of February was affected by cold E.N.E. winds with dry frosty weather, drying up the soil but retarding vegetation and destroying the early setting of peas and beans (28 February). During the 1799/1800 winter westerly winds over Britain were much less frequent than normal and both London and Edinburgh had a strong development of easterlies (Brooks and Hunt 1933). Cold frosty weather continued until a slight warming about 11 March, but March was cold from the nineteenth until the end of the month. The E.N.E. winds gave "very cold dry barren weather." The wall fruit trees blossomed late and vegetation was "very slow indeed" (26 March). However, the weather picked up in April, and he was able to record on 24 April, "Very fine seasonable Weather indeed—everything in vegetation grows very fast . . . as fine a Barley Sowing as ever was known."

He was able to cut one of his hot-bed cucumbers 11 May, but that day and the next were cold with a bitter E.N.E. wind. Despite everything 16 May was "mild delightful weather for vegetation, Grass scarce ever known so early or so plentiful."

The Woodforde diary does not permit a general comment on the beginning of the 1800/01 winter. Both on 9 and on 22 December 1800 he noted the fine open weather for the season. There was heavy snow on the night 26/27 and 28/29 December but, although 30 December had a hard frost, it was "fine cheery Weather." January 1801 was not very cold and closed on the last day with fine, mild weather which continued into the first week of February. On 5 February the bees were "quite brisk," crocus and snowdrops were in full bloom and gooseberries were in leaf. Between 12 and 18 February, however, it was frosty and snowy. Individual days in March were cold, whilst April tended to be cold with snow almost all day long on 12 April...

The first cold weather of the 1801/2 winter was a sharp frost on 6 November with inch thick ice on water about the place. From 22 November to the end of the month there was cold weather and there was a hard frost on 18 December and snow on 31 December, but neither month was very cold. Thereafter the first half of January 1802 was cold almost every day and reached its severest on 16 January when the frost was "more & more severe. The Milk in the Dairy froze tho' the Window covered with Woollen apron . . . The Meat bought by the butcher had to be thawed by the fire. It felt like Pieces of Wood and sounded as much when put on the Table." This was practically the end of any severe winter. A thaw set in on 17 January and continued to the next day. In the second week of February there was a quantity of snow on 7, 8 and 14 February, but it did not appear to persist. 26 March experienced very fine weather and by 5 April he recorded, "Vegetation in great forwardness to-day. Our Apricot-Tree full indeed of fruit, all set and I think now out of danger." Such forecasts are dangerous to make in Britain. Although April was generally a favourable month, there were snow and hail storms on 12 and 13 April and it was very cold. With a sharp cutting north-east wind on 30 April, the "Vegetation (was) rather at a Stand" Cold Weather had a final fling in May with a hard frost and quite thick ice on 15 May. The next day "The Weather (was) uncommonly cold with much snow about Noon . . . " Still on 25 May, "the vegetation goes slowly, strong easterly Wind prevails", but a fine June followed and the diary entry for 5 June was, "Very fine Weather indeed . . . All Vegetation in the highest State of Growth and appearance of Great Crops of Grain etc."

In general the two decades, 1780s and 1790s were cold in England. The 1780s was the colder decade of the two, though individual months, notably January 1795, in the 1790s were cold. In Central England the long temperature record showed that the winters and springs of 1799* and 1795 were especially severe. Cold winter and spring seasons were characteristic of 1783, 1784, 1785, 1786, 1789 and 1797, whilst mild seasons included 1787, 1788, 1790, 1791, 1794, 1796, 1798 and 1801. In addition the December to February periods of 1780, 1792, 1800 and 1802 and the springs of 1782 and 1793 were cold. It is also of interest to note that London over the years 1794-1810 displayed a remarkable preponderance of easterly resultant winds (Brooks and Hunt 1933). Winds at

* The year listed is that including the January.

London changed from more westerly and zonal to more southerly and less zonal over the period 1787-1800.

Summer seasons and the agricultural calendar of the period 1782-1802.

The late spring, summer or autumn temperatures are of economic significance since in the eighteenth century agricultural prosperity was in several respects more weather sensitive than it is to-day. Earliness or lateness of season and the timing of the harvest are in part related to the temperatures of the growing season. With the exception of May in the 1791-1800 decade, all the decadal monthly means in Central England for April to August for the decades 1781-90 and 1791-1800 were warmer than the means for the same months for the long period 1698-1950.

Woodforde provides far less information on thermal conditions in the summer months than he does for the colder seasons of the year. It is possible, therefore, only to identify the more extreme characteristics.

Diary entries point to the hot June to August spell in 1783. Woodforde recorded very hot weather on 5, 25 and 26 June and on 28 July he observed, "This has been the hottest day this year and I believe the hottest I ever felt—many say the same." Indeed no other July from 1697 to the present has been warmer in Central England. It is of interest that Woodforde observed the hazy conditions and reddish sun (25 June, 13 July). Such characteristics were observed in the same period elsewhere in England and part of Europe and were the result of volcanic eruptions in the eastern Mediterranean and the spread of dust north and north-west.

The next summer for which any picture can be derived from the diary is 1793. Woodforde noted that 20 June was "very cold indeed for the time of year." He then went on a summer visit to Wiltshire (8 July to 23 October). The day he travelled he found intensely hot, and on 10 July he noted, "We have not had for many years such a continuation of warm Weather as of late." He was still experiencing hot weather on 2 August, "We have not had so warm a Summer for many Years as this seems to promise." No further details are available for the rest of August. The Central England record shows that July 1973 was moderately above the long term average and the hottest July since the hot July of 1783. July 1794 was also hot in Central England but except for a reading from his thermometer of 102°F (7 July; the thermometer must have been directly in the sun's rays) Woodforde provides no comment.

From April to June 1798 the Central England temperature were well above the long period average. In East Anglia garden crops and hay making were easy and many of the diary entries indicate fair weather though with no indication of the warmth of the period. He did report that it was very hot on 28 and 29 June and described 8 July as hot. He complained of the heat on 11 and 21 to 23 August, on the 21 August remarking, ". . . The heat of the weather makes me very languid." East Anglia seems to have experienced a longer continuation of the summer heat than further west where August was only slightly warmer than normal. On 17 September Woodforde recorded "Very fine Weather still continues, scarce ever known such a long continuance of so remarkable fine weather . . . and again on 27 September he wrote "The Autumnal Rains seem now (to be) coming on. For the last few month we have had the finest and fairest Weather that I ever knew in my life to the best of my knowledge."

The Central England record shows the 1799 summer as unseasonably cool, but in Woodforde's diary after the cold June there is little information about July and August. 6 and 7 July were hot but thereafter the summer seems to have been wet, for instance the entry for 3 August, "It has rained more or less ever since St. Swithin" (15 July). On 3 September he wrote of the damage by the late winds and rain to his wheat, though it seems to have been fine since 25 August and the rest of September was favourable for harvesting.

In contrast the summer of 1800 was very dry and warm. Woodforde commented particularly on the heat from 30 July on. On that day he wrote, "Very fine Weather still continues and very hot" and on 2 August, "Very fair and very hot indeed, Thermometer about Noon in the Study with Window open up to No. 100 without any Sun in the Room . . . Afternoon still hotter Thermom. up to 102." It was dry and hot on 7, 8 and 10 August, whilst he recorded on 13 August "The same dry and hot Weather prevails". It was also hot the next day. In 1801 both July and August seemed to have had some warm weather, but it appears to have been a fine rather than hot spell with hot conditions being identified only on 23 August. In contrast for 1802 the impression given by the diary was of a cool July. He wrote of people using their winter cloths on 11 July and of himself having a fire in his study "it being quite cold" on 15 July. In Central England this July was the coldest for any of those in the period covered by the diary.

In attempting to reconstruct the pattern of summer warmth some assistance is given from descriptions of the state and conditions of the harvest. Table 3 assembles the somewhat incomplete details Woodforde provided on his farming calendar. No comment is available unfortunately for many of the hay or grain harvests.

The first entry of interest indicated that Woodforde completed his 1785 harvest by 14 September. In England generally August and September were wet and the harvest was late (Jones 1964). After a week of wet weather prior to 20 August Woodforde managed to get his harvest in late but without too great difficulty. On 25 September 1789 he was able to write "Scarce ever known a more plentiful Harvest in Norfolk and elsewhere. The June of 1790 was wet and we read the entry (12 July), "Very ticklish weather still for haymaking." Despite "delightful harvest weather" (25 August) the rest of the harvest had unsettled weather and was still in progress on 8 September. On the other hand the 1794 harvest was very favourable, he took only 20 days to complete it and this was the earliest date of any harvest. With a fine dry August the 1796 harvest started well. He began cutting early and by 27 August most of it had been carried. However rain showers then delayed completion until 10 September. He gave no completion dates for the 1797 grain or hay harvests, but he did observe on 21 August "Rather ticklish Weather for the Harvest (similar conditions were experienced on other parts of England). Rain almost every Day". Dry spells in the first half of the year facilitated the gathering of the 1798 hay harvest, whilst, despite a wet July, August turned out hot and fine. On 24 August he recorded "Delightful Harvest weather still continues" and on 25 August "All our Corn safely lodged in the Barn. The finest and shortest Harvest I ever remembered I think." It was also favourable elsewhere in England. Although he commented on 3 July 1799 that the weather was good for the early hay, rain from the middle of July led him to write on 25 July "Very casualty Weather for the hay." On 3 August he

TABLE 3

The agricultural calendar at Weston Longeville, Norfolk, 1778-1802.

YEAR	SOWING BARLEY	SOWING WINTER WHEAT	CUTTING HAY	CARRY-ING HAY	CUT-TING WHEAT	WHEAT HAR-VEST COM-PLETED	ALL HAR-VEST COMPL-ETED INCL-UDING OATS & BARLEY	GENERAL COMMENTS
1778						Aug 17		Record incomplete
1779								Record incomplete
1780								Record incomplete
1781					Aug 6			very early harvest
1782								Away from Norfolk
1783		Nov 1		July 4				Hay good
1784							Sep 4	Difficult wet Aug.
1785				June 30	Aug 18		Sep 14	Wet after mid Aug.
1786			July 3	July 11				Away from Norfolk
1787							Sep 24	Wet early Sept.
1788					Aug 18	Aug 29	Sep 2	Easy harvest
1789	Apr 22						By Sep 15	September wet
1790				July 8	Aug 27		After Sep 8	Good August, wet early September
				Before	Aug 26			Hay difficult
1791			June 20	June 29	completed			Fine Grain harvest
1791			June 26	July 6				No grain harvest details
1793	Apr 1							Away from Norfolk
1794			June 2				Aug 21	Exc. grain harvest
1795								Away from Norfolk
1796			June 29		Aug 18		Sep 10	Haymaking impeded
1997								Wet August and September
1798			June 20	June 28	Aug 6		Aug 25	Early harvest
1799			July 3	After July 16	Sept 2	Sep 11		Wet late harvest
1800				July 8	Aug 14		Sep 11	Delayed grain harvest
1801	Apr 24	Oct 8		June 26	Aug 11	Aug 19	Aug 31	Good harvest weather
1802			June 25	July 14			Sep 2	Fine harvest weather

noted that it had "rained more or less ever since St. Swithin", and on 20 August the "Harvest very backward indeed this Year. Very few Farmers indeed have begun yet, none as I know of in our Parish." Though he had cut some oats earlier, he did not commence cutting his wheat until 2 September. Fortunately the September weather improved so that he could record (7 September) "Most delightful Harvest Weather thank God still continues & have all the last week." Despite a generally fine September (drier it would appear than in much of England) the later stages of the harvest were wet. The entry for 7 October reads, "Very indifferent Weather for the (remaining) Harvest. A great deal of Wheat still out in our Parish. All kinds of Grain likely to be very dear indeed." His forecast was confirmed, for instance on 25 February 1800 the entry was, "The Price of Wheat being so very dear (£6 per quarter; a price also reached in December 1795). At present occasions very great grumbling amongst the Poor."

1800 promised well. On 16 May he wrote "Grass scarce ever known so early or so plentiful." Growing conditions were favourable for grass and grain alike. The first half of August was hot and dry, but the weather changed to become wet and difficult, carrying of the harvest was impeded, grain grew out in the fields and the harvest was finally completed on 11 September. Wheat prices continued high attaining "an enormous price" (£7.10.0 per quarter) on 31 January 1801. Good weather in early June helped his 1801 hay making and it was "very well made" by 26 June, "It makes very little Show but smells like a Violet." The grain harvest was also good, "I think I never knew such fine Weather during any Harvest" (24 August). He carried some of his second crop of clover grass on 31 August, but because of the drought "we were obliged to feed our stock with some of our 2nd crop clover." Favourable farming conditions contributed to his entry (25 October), "Price of All kinds Meat and Grain coming down". 1802 also had a favourable late August and early September " . . . finer harvest weather scarce ever known" (2 September).

The Pattern of rainfall

England and Wales in general were drier than the normal (based on the 1881-1915 mean. Nicholas and Glasspole 1931) in the 1780s decade, but marginally above in the next decade. 1800 to 1802 were also below the normal. Over the years covered by Woodforde's diary England had 9 years above normal, but only 1782, 1789, 1792 and 1797 were markedly wetter. The most marked dry years were 1780 and 1788. Generally East Anglia shared these experiences but some discrepancies appear. Woodforde's diary only permits the identification of the general characteristics of the particular and usually extreme seasons or spells of weather. He makes more comment about dry conditions and generally records little of wet weather except when it affected harvesting activities. The floods he described were mainly those resulting from a rapid thaw of heavy snow.

He observed on 30 March 1779 " . . . we have had no settled Rain for any time for almost 2 years last past." In 1779 dry fine weather had persisted from the start of the year. In England January to March 1779 were exceptionally dry. The diary does not enable one to evaluate the conditions in 1782 which was wet elsewhere. In England February was generally wet (at Kew it was extremely wet, Wales-Smith 1971 and 1973) and the diary entry of 7 February, "Very wet season indeed every Day Rain, my Garden almost covered with Water—every Ditch brim full", clearly suggests the East Anglian experience was similar. The next

indication of the rainfall was given by the entry of 8 May 1785 (after a dry spring) "I prayed for Rain this morning . . . it being much wanted especially the lent crops of Barley etc." On 17 May he noted "most gracious and gentle Rain most part of the Day . . . Rain was greatly wanted in these parts. The Barley could not get out of Ground before the late sown." In England a sequence of dry or very dry months occurred from December 1784 to June 1785, with March, April and May 1785 being driest. By themselves little can be gleaned from Woodforde's diary for the years 1786-91. 1788 was the driest year at Kew in the period of the diary and the driest since 1743 (slightly below 1781). For the composite England record one must go back to 1731 to find a drier year. Yet Woodforde made no comment. Indeed we find (6 January and 1 March 1788) remarks about the wetness of the land and entries of heavy rain (9 January and 1 March). Though the easterly wind of March would have been dry, there was considerable rain on 20 and 23 March. 1788 experienced a number of heavy thunderstorms which should have kept the monthly totals up, for example 7 May, 18 June and 19 August. On the 20 September it rained "pouring from 4 this Afternoon all night" so that the wet conditions prevented people going to Church on the following day. December recorded a great deal of snow on 3, 21 ("most part of the day"), 28 and small snow on 31 December. The evidence, such as it is suggests that East Anglia did not have such a dry period as elsewhere. Kew indeed received no precipitation in the December 1788. The diary permits no comment on 1789 and little on 1790. However February 1790 (the driest at Kew since 1697) was a very fine sunny month in East Anglia, but Woodforde made no comment about March 1790 which was also very dry at Kew.

On 24 August 1791 Woodforde was writing "Rain much wanted for (the) Turnips etc. and almost all the Ponds and Dykes very nearly dry". In this case East Anglia would seem to have had drier conditions than other parts of England. In an otherwise wet year November 1792 in England was dry and the diary entry of 2 December is in accord with this, "Very dry. Roads almost as dry as Midsummer." In England generally, and at Kew in particular, June 1794 was the driest June over the years 1778-1802, but it may well have been that the very heavy rainfall of 14 June associated with a severe two-hour thunderstorm at Weston Longeville could have modified the local record. On 7 November 1794 his comment, "So much rain falling of late have raised the waters higher than have been known for many years" confirms the wetness of October and November elsewhere in England.

After the prolonged cold of early 1795 Woodforde complained (28 May), "We have had no Rain to signify the last six weeks. Every thing wanted Rain in short". May 1795 was the driest May elsewhere over the 1778-1802 sequence and indeed the driest of the eighteenth century at Kew.

The dryness as much as the coldness of the spring 1797 caused the late start of growth, but the diary entries suggest that East Anglia, like other parts of England, had an above average May and June rainfall. The harvest difficulties of August 1797 would seem to indicate its wetness, but the diary gives no clear hint of the wet September experienced elsewhere. A long spell of fine mild weather from the start of 1798 was associated with a run of 6 drier than average months in England. On 3 May 1798 Woodforde recorded, "A very great drought prevails at present. Rain much wanted." A thunderstorm on 21 June yielded welcome rain "after so long a continuance of dry Weather". On 2 July a "Flying

shower of rain (was) very acceptable indeed after so long a Drought." July turned out to be a wet month. August and September 1799 were extremely wet in England generally (though less so at Kew) and East Anglia to some extent was similar. Woodforde noted on 3 August that it had rained more or less daily ever since 15 July and the harvest difficulties have been remarked up already. His entry of 11 September, "Uncommonly fine Weather indeed we have had for the last 6 weeks past" seems out of harmony with the other information. December 1799, very dry elsewhere, seems to have been less dry in East Anglia with 5 days of snow including "much snow" on 19 December. July 1800 was another dry month in England (Kew had no rain at all) and a number of diary entries indicate this, for instance on 29 July, "All People must every where wish for Rain especially these parts of the Kingdom". Dry weather continuing into August caused a scarcity of pasture and farmers were forced to use their recently cut hay for their store cattle. On 13 August he noted, "Shrubs are wilting." but on 19 August and on subsequent days there was much welcomed rain. After a fine dry August 1801, heavy rainstorms in September recovered the balance, though from the diary it cannot be ascertained whether the month was as wet as the composite England record suggested. Kew did not receive excessive rainfall in September 1801. He complained of the high level of water in February 1802 due, it appears, to snow melt and heavy rain: On 21 February he observed, "the Lands glutted with Rain". The final entries in the diary emphasize the dryness of September 1802 in East Anglia, "Rain greatly wanted at the present time especially in this County which is almost burnt up" (19 September), "No appearance of Rain" (1 October) and "Dry Weather still continues" (2 October).

Other weather and related phenomena

It is difficult to provide other useful comparative weather data. He recorded a number of gales which damaged buildings and caused him to sit up through part or all of the night. These can be listed: 1 January 1779, 12 February 1781,, 12 March 1782, 16 June 1785, 14 December 1786, 23 and 31 October 1789 25 December 1790, 8, 17 January and 1 February 1791, 23 December 1792, 3 March 1793, 25 January, 16 October and 6 November 1795, 30 May and 3 June 1796, 21 January 1801. The list does not reveal any distinctive pattern.

On 1 January 1779 in the early hours there was "a most dreadful storm of wind with Hail and Snow." It continued all day until the evening damaging the barn and the roof and windows of the church so that it could not be used until 19 February. In the N.N.E. gale of 31 October 1779 there was loss of life and of shipping at Yarmouth. On 15 December 1790 he compared the strength of the wind as almost as high as 1 January 1779. The gale of 1 February 1791 about noon he described as "hurricaneous" . . . the Wind shook the house terribly and quite frightened us—as it did all Afternoon and Night and continued so till three in the Morning and all of us but the Boy sat up till that."

Thunderstorms are tabulated (Table 2). A few diary comments are of interest. 3 August 1797, "Thunder Storms almost every day for some last past . . . In many places (not Weston Longeville) it hath been very dreadful indeed. Many lives lost and much damage done—Almost every day for the last 3 Weeks we have had tempests". A thunderstorm which affected many parts of England on 1 July also struck Weston Longeville.

A common feature of diaries of the period was the recording of the date of the first sighting of the swallow. Woodforde provided a number of such dates: 21 April 1782, 23 April 1790, 3 May 1791, 23 April 1792, 17 April 1793, 15 April 1797, 6 May 1799, 29 April 1801 and 19 April 1802.

Other miscellaneous entries include the hailstorm of 31 May 1782 which caused great destruction to the corn at Weston Longeville and hail "the size of bullets" broke his windows and collected to the depth of 12 inches in the fields. Aurorae were observed on 13 and 31 October 1787 (a month of very high sunspots) and there was a solar eclipse (2 April 1791) and two lunar eclipses (10 September 1783 and 22 October 1790).

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BIRDS AND THE WEATHER OF 1784

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During the preparation of a series of historical daily weather charts for the 1780s many natural history references, including reports on the arrival and movements of birds, have been found in source material being used primarily for its meteorological content. It may be of interest to discuss these ornithological observations with reference to the actual weather situations which can now be synoptically interpreted on a daily basis from the weather maps being constructed. Both for reasons of meteorological interest and the availability of a number of ornithological reports from several locations in the British Isles and western Europe, 1784 has been chosen for the following discussion.

The year opened during a spell of very cold weather. Wintry conditions had already become established during the latter part of December 1783: on Christmas Day a broad belt of snow and sleet occurred in a very cold ESE'ly airstream to the north of a warm frontal zone which extended eastwards across southern England into northeast France from a deep and vigorous depression over southwest England. Apart from a few brief and temporary thaws, very cold weather with frequent snow continued throughout January and the first three weeks of February 1784. During this period the British Isles and much of Europe became covered with a deep and heavily drifted layer of snow; heavy falls of snow were recorded over low ground as far south as Provence. Rivers, lakes and shallow coastal waters became frozen over or affected by ice. The effect on wild animals and birds became evident with many of them becoming desperate enough to seek food and shelter in more vulnerable districts near villages and towns. Many birds perished: in both England and France blackbirds and thrushes were reported to be greatly reduced in numbers and in Provence it was also observed that many grosbeaks, swans and bustards had perished in the severe weather. The scarcity of game-birds in the following September was to be attributed to the very cold and snowy conditions of this winter.

On 8 and 9 January a col was located over England with calm or light and variable winds, occasional snow and patches of freezing fog. At Selborne in Hampshire wild-duck and wild-geese were sighted by Gilbert White on the stream near the village and much wild-fowl was reported on the lakes in the nearby forest. A grey or hooded crow, a species which is usually found in more open country or near the coast, was shot near the village on the 9th. This was only the third occasion that Gilbert White had seen this species at Selborne. On 30 January two long-billed curlews, one of which was shot, were sighted at Selborne. This species which normally winters on estuaries and mud-flats had only been seen now and then at Selborne in very long spells of cold and frosty weather. Before the time of binoculars and cameras birds were often shot for identification purposes as well as for sport. Pochard and woodcock were also shot on 30 January at Nacton on the Orwell estuary below Ipswich. With an anticyclone off southwest Ireland it was very cold and frosty on this day over southeast England in light NNW'ly winds; although sunny periods occurred inland there were occasional snow showers in coastal areas. Wild-fowl, divers and waders were shot at Nacton throughout January and February.

The long spell of very cold weather began to give way on 20 February when a mild SW'ly airstream began to be advected over western districts of the British Isles and France. The great thaw of melted snow and ice which took place in the following week caused widespread flooding in low-lying regions of England and France.

The first swallows to arrive in southern France in 1784 were sighted at Arles on 13 March in a moderate SE'ly wind. During the preceding three days there had been a rise of pressure over central France which had led to the formation of an anticyclone over the Massif Central and moderate to fresh Mistral conditions in Provence. However the wind pattern was virtually reversed on 13 March with a depression off Brittany and high pressure over Italy. The S to SW'ly winds up to at least 2000 to 3000 ft. over the western Mediterranean would now have favoured the northward migration of swallows into southern France from North Africa (Fig. 1). Any further migratory flights northward over France were probably curtailed by disturbed weather conditions: a depression was located over the Bay of Biscay from the 14th to 15th and from the 16th to 20th a vigorous frontal depression giving cyclonically variable winds, snow, rain and thunderstorms moved ENE from northern Spain across west and central districts of France into central Europe. After a quiet period from the 21st to 23rd with light and variable winds, a mild SW'ly airstream was advected over France from the 24th with the wind flow pattern being particularly intense on the 26th. However, during the 26th and 27th the mild conditions over northeast France were replaced by a cold NE'ly airstream. This series of meteorological events would seem to explain the arrival of swallows over Montdidier in Picardy and Arras in Artois on 26 and 27 March in overcast skies and near freezing conditions with a NE'ly wind and occasional wintry precipitation. The two or three swallows seen at Arras were flying over fish-ponds near the town.

After this unpromising start, swallows became less rare at Arras on 9 April and the first swallow was seen at Selborne on the same day. With a col situated over the southern North Sea the weather was dry with sunny periods and light and variable winds over northern France and southern England. Ten days later on the 19th a SW'ly airstream giving occasional rain and drizzle covered England and the arrival of swallows was recorded at Stratton Strawless near Norwich by the Norfolk naturalist Robert Marsham. This was about the normal date of their arrival at this site in East Anglia.

In Scandinavia the arrival of starlings is regarded as an indication of spring and in 1784 they were observed in flight in clear skies over Spydberg in southeast Norway on 5 April. This was the first day in over a month that the temperature at midday had risen above freezing point at this site. With a trough extending south from a depression over Iceland and an anticyclone over Denmark the winds at 2000 to 3000 ft. over the southern North Sea were SSW'ly and would have favoured spring migration flights into southern Norway from eastern England, the Low Countries and northern France (Fig. 2).

During late April woodcocks were observed in flight by Gilbert White at Selborne. He suggested that if any of these birds were seen during the spring it was probably on their return to the east coast after a winter spent in the west: the winds over southern England from 18 to 28 April were generally W'ly. The very cold winter of 1784 would probably have caused many resident and winter visitors to seek less severe quarters in western districts of the British Isles.

On 15 April martins were first sighted at Arles in a light SW'ly wind. With a depression over the Bay of Biscay and high pressure over Italy the synoptic situation was remarkably similar to the one when swallows were first sighted at the same site on 13 March (Fig. 1) and would appear to represent a preferred wind flow pattern for the passage of summer migrants into southern France from North Africa.

The arrival of swallows at Stockholm was also recorded in 1784 and again this event gains significance when related to the prevailing meteorological situation. A trough moved ENE across Denmark and southern Scandinavia from 11 to 13 May, At Stockholm occasional snow occurred in a cold SE'ly late on the 12th and during the morning of the 13th, when fog was also reported. However, during the afternoon the wind veered to W'ly and swallows were first sighted under cloudy but dry skies. On the following day the full effect of a broad W'ly airstream covering the British Isles, North Sea and southern Scandinavia was felt at Stockholm when the temperature at midday rose to 14°C, nine degrees higher than on the previous day. With temperatures remaining mostly between 15° to 18°C for the rest of May the newly arrived swallows over southern Scandinavia were evidently more fortunate with the persistence of warmer conditions than those which had appeared over northern France seven weeks before. Although the spring of 1784 was very retarded the weather rapidly became very warm in an anticyclonic spell from 13 to 26 May. Gilbert White observed in his journal:

> "Such is the vicissitudes of matters where weather is concerned; that the spring, which last month was unusually backward, is now forward."

The rapid change of the seasons seems to have affected the activity of larvae and insects: an abundance of caterpillars and cockchafers was reported in Artois, Picardy and Burgundy during May. Many trees were completely stripped of their leaves by the ravages of these insects. Fine anticyclonic weather also occurred over northern Britain during early June and, as in France during May, an abundance of caterpillars and other larvae were reported in east Scotland. Perhaps the very cold weather in the earlier part of the year had upset the normal feeding habits of birds so as to give rise to this upsurge of activity in the insect world over a wide area of Europe.

The weather situation over Europe in the autumn of 1784 may also have been pertinent to the movement and arrival of winter migrants over England and northern France. From the end of September to 18 October an anticyclone moved slowly over southern Scandinavia and the southern North Sea. The northeast to east winds which occurred along the southern boundary of this persistent high pressure system would have favoured large-scale migratory flights of winter visitors westward across England and northern France. For example, after a dry and sunny day with a NE to E'ly wind woodcocks were seen in the woodlands near Selborne on the evening of 1 October. In similar weather robins appeared at Arras on 17 and 18 October and redwings were sighted on Selborne common on 23 October.

Later in the year large numbers of wild-geese and swans were seen in flight over Arras on 12 to 15 December. Large-scale movements of wild-fowl at this time of the year were regarded as heralding the onset of wintry conditions. This

indeed was the situation for wintry showers and continuous snow with drifting had already occurred earlier in the month, and from the 12th to 17th N to NE'ly winds associated with a large and complex area of low pressure over the Continental mainland brought further heavy falls of snow with drifting over France and the British Isles.

And so the year ended as it had begun during a spell of very cold and snowy weather with birds taking whatever instinctive precautions were left open to them for survival in an inhospitable environment.

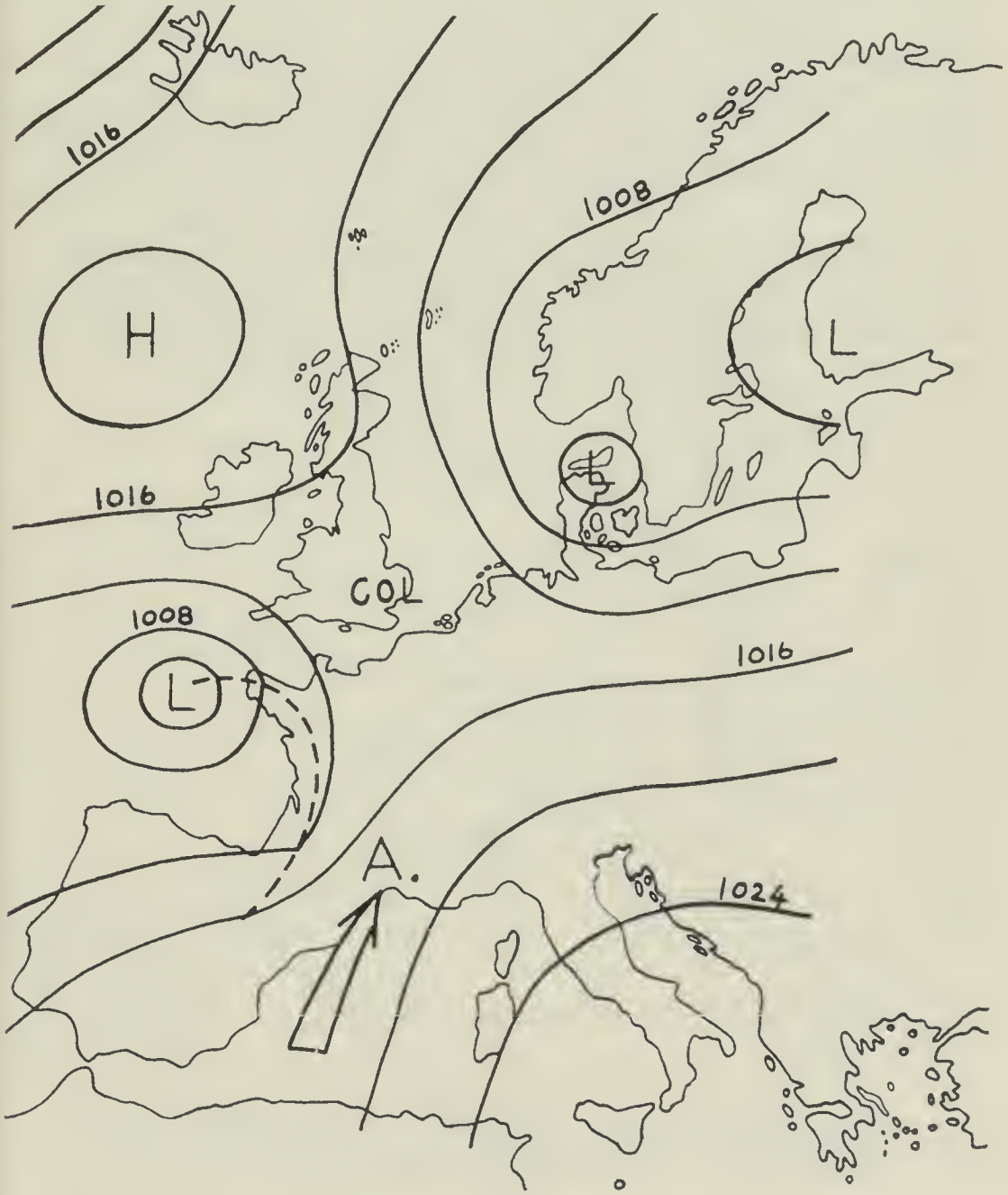

FIG. 1 Synoptic weather map for 13 March 1784 at 14h A—Arles
Arrow indicates wind direction over western Mediterranean

It is hoped that from the examples given in this brief discussion the ornithological reports made by eighteenth-century observers can be seen to gain significance when assembled and viewed against the background of the synoptic weather situations that are being obtained from the series of daily historical weather charts from 1780 onwards.

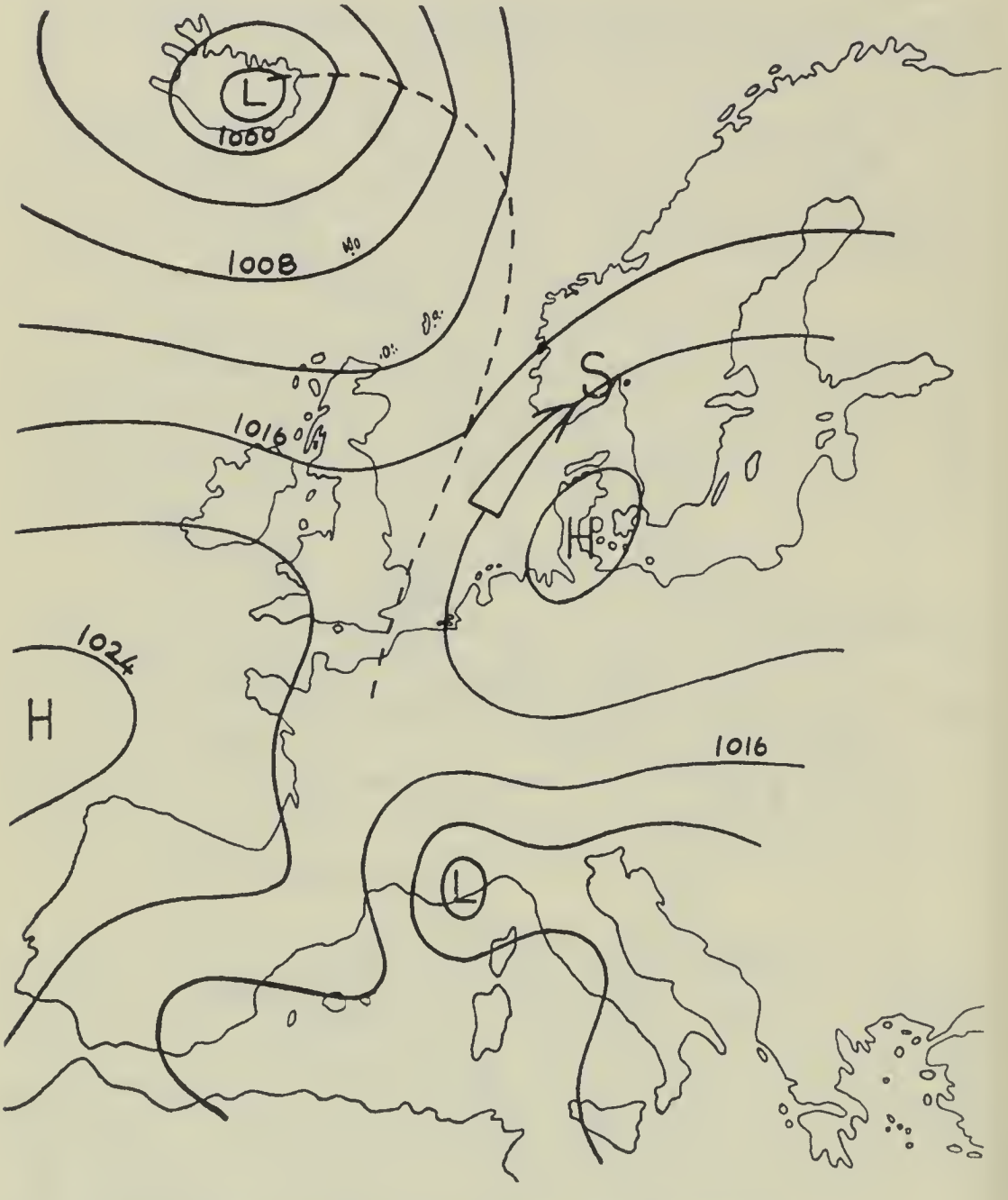

FIG 2 Synoptic weather map for 5 April 1784 at 14h S—Spydberg
Arrow indicates wind direction over southern North Sea

SOME STUDIES IN THE ECOLOGY OF SALT PANS

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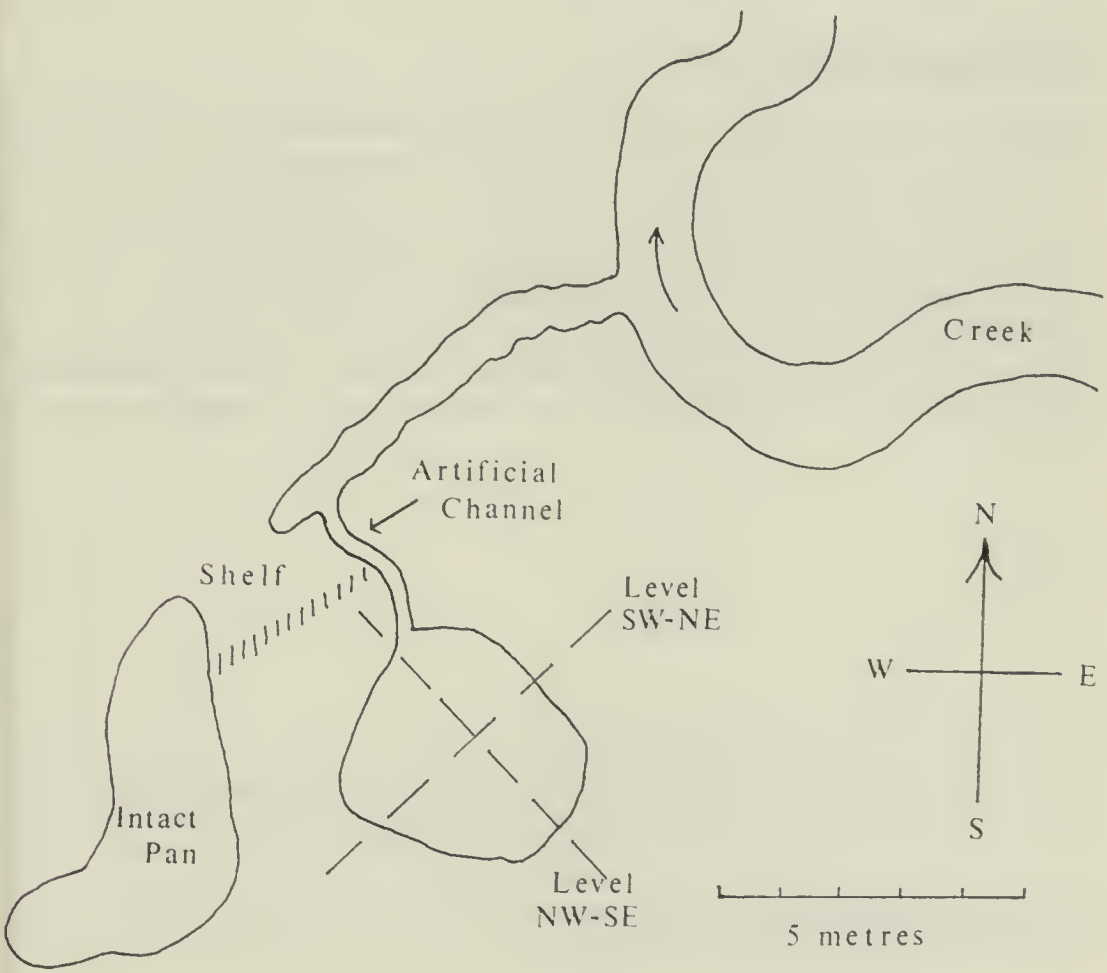
Introduction

The area of study consists of some 40 square metres of salt marsh including two salt pans, near the western end of the eleven-kilometre stretch of marsh—one of the longest left in Western Europe—which runs from Wells to Blakeney on the North Norfolk coast. The exact location is at TF 931439, just East of the Wells/ Warham boundary.

The two pans, separated by a strip of marsh about two metres wide, are of different types. The westernmost, referred to below as the "control" pan, is an interrupted creek, while the other, referred to as the drained pan, is a residual one assumed to have been there since the formation of the marsh. The salt marsh here is stable, or at least evolving extremely slowly, and would no doubt be classified by Chapman (1934) as "General Salt Marsh".

The objective was to make a close study of this piece of marsh, both in its natural state and modified experimentally, considering physiographical, botanical and zoological aspects. The zoological aspect has been perhaps the least rewarding; the possible reasons for this are discussed later.



The Study up to the end of 1972.

This particular spot was chosen because the residual pan, roughly circular in shape, was within two metres of a minor tidal creek, but had apparently never been connected with it. It seemed an ideal place to study an artificially modified marsh environment, so, with the permission of the Nature Conservancy, who administer the Holkham National Nature Reserve in which the marsh lies, the pan was emptied on the 30th May 1970, by digging an approximately 20 cm wide channel to the adjacent creek. The channel was made slightly serpentine in shape, mainly for aesthetic reasons (nothing is straight on a salt marsh!) The effect of this modification, of course, is to change the mud at the bottom of the pan from a more or less permanently submerged state to one in which is is only occasionally submerged, and then only for a few hours at the most.

The drained pan had been one which dried out only occasionally in its natural state, in times of prolonged mid-summer drought. Equinoctial spring tides regularly kept it topped up, and the mud normally remained wet during the winter solsticial spring tides, though this may have been due as much to rain water as to the sea. There are other pans nearby which dry out regularly; the reason for this difference is not clear, but it may be connected with some variation in the porosity of the mud. There are also examples of pans which have become drained by presumably natural changes, such as the cutting back of creeks; these are dealt with at greater length below.

1 Physiographical changes

Although the main intention was to study plant recolonisation of the mud it may be of some interest to record the physical development of the mud itself. The weather was predominantly warm and dry in the weeks following the cutting of the drainage channel. By the 3rd June 1970—i.e. only four days after emptying —the surface of the mud had begun to crack. Four weeks later the cracks had widened considerably, the mud having assumed the general appearance that it kept until 1972. The main subsequent change has been less obvious, but probably more significant; the relatively hard tops of each polygon of mud are being undercut. By April 1972 a cross-section through these polygons would have looked like this:

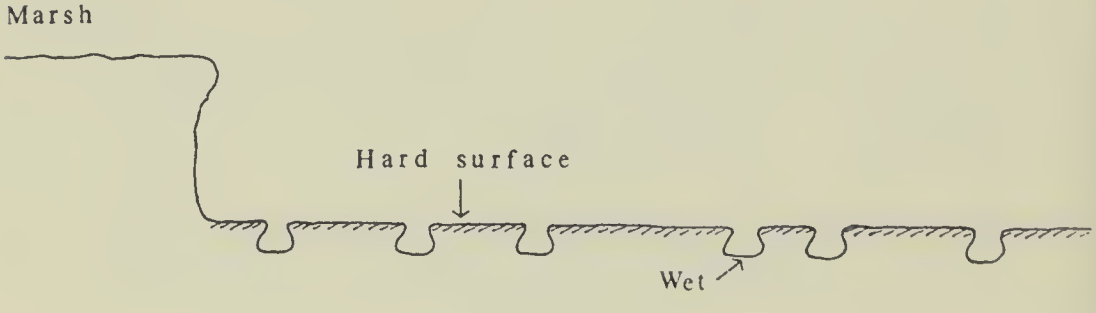


FIG. 1: Section through Mud Polygons

Accretion

Mud accretion since 1970, if any, has been so slight as to escape detection. When a hole was dug on the adjoining marsh to examine the substrate, the original plant layer was replaced in squares; a year later the plants were flourishing, but the gaps between each square had not filled at all. It should perhaps be pointed out that the area under study is about 1.5 kilometres from the beach and 5 kilometres from the open sea, so it is likely that the amount of mud brought in by the tides is minimal.

Salinity

Several checks on the water from the "control" pan, shortly after it has been covered by the tide, have given a figure of 34‰, so it is assumed that this represents a standard salinity for this part of the North Sea. Salinity is determined by titration with silver nitrate at a concentration of 27.25 g per litre, with potassium dichromate as the end-point indicator.

Tests of water from various pans near the study area during the periods of hot weather and absence of marsh-covering tides have given results as high as 42‰, while on the 30th June, 1970, after 19 mm of rain the previous day, the figure was down to 9‰.

On the 1st June 1972 an attempt was made to establish if there is any variation in the salinity of mud taken from different parts of the drained pan. A sample was taken from the centre and another from the edge; 100g of each, still in its wet coherent state, was broken down with 250m. of distilled water. 25ml of the resulting mixture was filtered and boiled away; the results are given in Table 1.

TABLE 1

Relative salinity of Centre and Edge of Drained Pan

	EDGE	CENTRE
Weight of beaker	89.53 g	87.54 g
Weight of beaker + salts derived from 10 g of mud	89.76 g	87.76 g
Weight of salts	0.23 g	0.22 g
Grams of salts per 100 g wet mud	2.3 g	2.2 g

2 Plant Ecology

As mentioned in the introduction, the study area is a very small part of the extensive stretch of General Salt Marsh forming the mainland side of the Wells-Blakeney salt marsh. In our immediate section, which is roughly 0.8km E-W by 0.4km N-S, bounded on three sides by major creeks, there are known to grow seventeen species of flowering plants, some showing a distinct preference for the "hummocks" (some 20cm above general marsh level), others for the lower, wetter parts, and others reasonably tolerant of either, as shown in Table 2:

TABLE 2

Preferred Habitat of General Salt Marsh Phanerogams

HUMMOCKS	FLAT/WET	EITHER
Sueda fruticosa Forsk	*Spartina anglica*	*Plantago maritima* L
(highest marsh)	*Salicornia sp.* (annual)	*Armeria maritima* (Mill) Willd.
Festuca rubra L.	(reaching well down	
Agropyron pungens (Pers) Roem. & Schult.	creek sides)	*Cochlearia anglica* L.
	Salicornia perennis Mill	
Artemisia mariima L.	*Suaeda maritima* (L) Dum.	
Halimione portulacoides (L) Aell.	*Aster tripolium* L.	
	Limonium vulgare Mill	
(sometimes at lower levels)	*Spergularia media* (L) C. Presl.	
	Triglochin maritima L	
	Puccinellia maritima (Huds) Parl.	

Within the confines of the study area the species present are : *Salicornia* (both spp.) *Suaeda maritima*, *Puccinellia*, *Limonium*, *Aster*, *Triglochin*, *Armeria*, *Halimone* and *Spergularia*.

Halimione, as usual, covers the creek edges, but there are a few specimens around the edges of the pans. *Triglochin* is mainly restricted to one large plant at the edge of the shelf between the two pans (see map) and the full-size plants of *Aster* are at the northern end of the "control" pan, though very stunted plants complete with flowers (down to 8 cm high) are scattered elsewhere. As usual on this coast, *Aster* is of the variety *discoideus* (Rchb). Only one plant of *Spergularia* has been seen, in the drained pan in 1972.

Plant Colonisation of the Drained Pan

Between the draining of the pan (30.5.70) and the following spring no plants grew in the exposed mud of the pan bottom. From this it must be assumed that seeds falling into the water of salt pans either die or do not germinate until the season following the return of (apparently) suitable conditions for growth.

On the 17th March 1971, the first seedlings were seen; not more than half a dozen were located, and were tentatively identified as *Salicornia* and *Suaeda maritima* (from sketches by Dalby, 1970). By the end of the month, however, all the seedlings had gone, presumably washed out by the equinoctial spring tides. On the 11th April seedlings had appeared again, especially around the edge under the marsh overhang. These were apparently of the same species as in March. By this time the surrounding marsh was showing the first signs of plant growth; leaves of *Aster* and large masses of seedlings of *Salicornia*. It is possible that there were seedlings of other species too, but to find them would have necessitated an extremely minute search, as no other seedlings seem to occur in such concentration as those of *Salicornia*.

Further visits in April revealed a similar situation, with the addition of a filamentous alga—a very thin form of *Enteromorpha intestinalis* (L) Link (det. British Museum, per K. B. Clarke)—coating the mud surface around the edge. Most of the seedlings were still close to the periphery; the furthest in towards the centre was at about 30 cm (*Suaeda maritima*). The last forecast marsh-covering tides were at the end of April, but in fact there was flooding on the 23rd and 24th May, when North winds raised the tides above forecast level (large numbers of nests of the Black-headed Gull *Larus ridibundus* L. about 1 km to the North were washed out).

A survey on the 1st June 1971, showed plants now well established in the pan. They were mainly on the South and West sides—*Salicornia* and *Suaeda maritima* with some *Puccinellia*. There were also signs of an inward growth of *Limonium* from the perennial root-stock under the marsh overhang. By this time the *Armeria* on the surrounding marsh was in full flower, and leaves of *Limonium* were showing characteristic patches of the orange rust-fungus *Uromyces limonii* (DC) Lev.

On the 1st July the *Salicornia* and *Suaeda* plants were up to 10 cm high. On the marsh, *Limonium* was just beginning to flower, and odd flowers of *Aster* were appearing (although the main flowering period for this species is in the autumn), generally with a few ray-florets.

By the end of the growing season there was an estimated 10-15% plant coverage in the pan. A count on the 24th September 1971 showed that there were:

198 plants of *Salicornia*, up to 33 cm high, average c. 20 cm.

40 plants of *Suaeda maritima*, up to 36 cm high (the tallest were probably of the ssp. *flexilis* (Focke) Rouy)

5 plants of *Puccinellia*

5 plants of *Aster*

Nearly all the plants were within a 35 cm belt around the edge of the pan. Of the last two species, all but two *Aster* were on the West side. The *Salicornia* and *Suaeda* were pretty evenly distributed in the belt. The furthest in from the edge were a *Suaeda* at 80 cm and a *Salicornia* at 100 cm. On the surrounding General Salt Marsh the height of plant growth was fairly uniform at 10-15 cm, apart from one clump of *Aster* at the northern end of the "control" pan which was up to 35 cm.

1972 Developments

A visit on the 4th February showed no new plant development, but a majority of the dead *Salicornia* plants were still standing and plants of *Puccinellia* and *Aster* seemed to be over-wintering successfully. On the marsh were many droppings of the Brent Goose *Branta bernicla* (L.) which no doubt contribute nitrogen and other nutrients to the marsh plants. By the 16th March, seedlings had appeared, certainly *Suaeda maritima*, probably *Salicornia*, but in small numbers. On the surrounding marsh further seedlings were found, apparently *Aster* and *Halimione*.

On the 21st March there were plenty of *Salicornia* seedlings in the cracks and depressions in the mud, even in water to 5 mm deep, and some seedlings of *Suaeda*. The *Entermorpha intestinalis* had appeared again, at and below the level of the *Salicornia*. In a shell of *Scrobicularia plana* da Costa, containing c. 3mm depth of mud, there were three *Salicornia* seedlings—surely constituting the smallest salt marsh ever! The only perennials at this time showing any growth on the surrounding marsh were *Armeria* and *Aster*.

After further marsh-covering tides, on the 17th April many of the seedlings had gone, presumably washed out; the surviving ones were mainly in the cracks between the mud polygons (now showing signs of erosion, as mentioned above). Some *Cochlearia* was in flower on other parts of the marsh, but not in our immediate vicinity. Flowering heads of *Triglochin* were just appearing.

On June 12th 1972 it was becoming apparent that there was already evidence of greater numbers of plants than the previous year. *Salicornia* covered much more of the pan than previously, extending further out towards the centre; in fact all over the pan apart from the patch on the East side (see Figure 2) which was somewhat lower than the rest. Many plants of *Suaeda maritima* were also present, and the *Puccinellia* plants (nine in number) much more obvious and beginning to flower. A single plant of *Spergularia* was the first of that species recorded in the pan.

This visit also showed that the polygons of mud were at last starting to break up; the lowest part was already smooth—perhaps the very heavy rain of the preceding weeks had hastened the process.

On July 14th only one *Puccinellia* plant was in flower and the *Spergularia* had flowered. The *Aster* seedlings, seen in the spring, had disappeared (tides had covered the marsh on the preceding two or three days) but the *Salicornia* and *Suaeda* were still much more abundant than in 1971.

End-of Season count, 5th September, 1972.

		Increase over 1971
Salicornia (mean of two counts)	730	268%
Suaeda maritima (ditto)	120	200%
Puccinellia	8	60%
Aster	6	20%
Halimione	1	not present
Spergularia	1	not present

Levelling

To see if the plant distribution bore any relation to the level of the mud in the pan, two accurate levels were run on the 1st June 1972, one roughly NW/SE, and other NE/SW (see map 2), and were correlated to the level of the water in the "control" pan.

Showing the drained salt pan with the artificial channel at the top

Details of the entrance to the artificial channel with clumps of *Puccinellia maritima*

Showing the mud surface with emergent shoots of *Salicornia europaea* agg. and a central clump of *Puccinellia maritima*

Edge of salt pan showing overhanging plants of sea lavender, *Limonium vulgare*.

Surveying poles were driven in on either side of the pan and levelled with each other by water in a long tube with glass sections at each end. The arbitrary datum point on the pole nearer to the "control" pan was levelled to another pole driven into the mud beneath the water, and it was discovered, somewhat to our horror, that the arbitrary datum selected was exactly 50 cm above the water level.

A string was then tightly drawn between the data on the original two poles, and the distance below this line to the mud surface measured. All measurements were to the surface of the mud polygons, taken to represent the original mud level before drainage, and were made at 20 cm intervals. The results are shown in Figure 2 and Appendix 2.

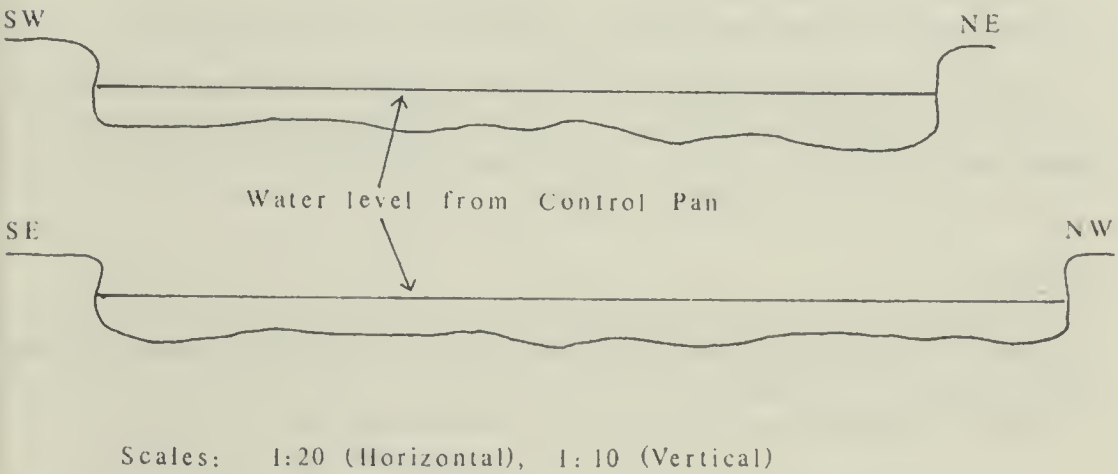


FIG. 2: Profiles of Drained Pan.

From Figure 2 it is apparent that the only area significantly different in level from the rest is towards the East side, two to three cm lower than the remainder of the pan. In 1971 the plant growth in this part was not obviously different from the rest, but in June 1972 it was noticeable that *Salicornia* was in the main missing from it.

3 Animal Ecology

The number of animal species living permanently on the salt marsh is believed to be small; on the other hand, many species of birds use the marsh for feeding and roosting, and a few for nesting. These probably have little effect on the study area, apart from the contribution of droppings mentioned above. A list of birds seen on the marsh is given in Appendix 1.

When the salt pan was first drained (May 1970) there were many bumps and irregularities in the mud caused by Lugworms *Arenicola marina* L. Also there were shells of the Trough-shell *Scrobicularia plana*, which had almost certainly been living there, as it is present pretty generally in the pans. Since the draining of the pan the surface of the mud has become riddled with the holes of the amphipod *Corophium volutator* (Pallas).

On the 1st June 1971 the following species were present in the "control" pan:

The prawn *Leander squilla* (=*Palaemon elegans*) L.	at least 20
The polychaete *Nereis diversicolor* O.F.Mull.	1 found
The Shore Crab *Carcinus maenas* (L.)	1 found
The amphipod *Orchestia* sp (?) *mediterranea* (Pallas)	3 found

Since then, small numbers of gobies *Pomatoschistus microps* (Kroyer) have occasionally been seen in summer, and casts of *Arenicola* have regularly been present, including some very fine ones, presumably of a different species, at the shallow North end, where spoil from digging the drainage channel was thrown in.

The gobies referred to above are abundant in some of the shallower pans, but are only infrequently seen in ours, which is on average 25 cm deep.

On the surrounding marsh, the only abundant animals noticed have been the Spire Shell *Hydrobia ulvae* Penn. and a black spider, possibly *Zelotes electus* Brent Geese are known to have been present in the study area, as their droppings have been found (v. supr. p.149).

Discussion

Salt marsh plant and animal communities would seem to have affinities with other "extreme" habitats, such as mountain tops, rocky shores and their splash-zones, tundra and bog, where the species present are limited to those sufficiently specialised to survive in the exceptional conditions.

In our case the limiting factor is the presence of salt water in what is in many respects a terrestrial habitat; if a salt marsh for any reason ceases at least occasionally to be flooded by the tide it ceases to be a salt marsh, and may quickly become indistinguishable from marshes which have always been fresh, apart from the tell-tale imprint of the creek systems, generally visible from the air if not from the ground.

Salt marshes can form in estuaries, lagoons or even, as in Norfolk, on open shorelines, provided that the sea is shallow enough and sufficiently undisturbed to allow suspended mud to settle. The latter condition is provided on the North Norfolk coast mainly by offshore sand and shingle-spits which sheltered the spaces where the salt marshes have developed—such shingle and dune complexes as Scolt Head Island, Blakeney Point and the East Hills in Wells.

When mud has been deposited to such an extent that it is exposed at low tide it begins to be colonised by halophytic plants; often *Salicornia* or *Spartina* are the first to appear. The presence of plants encourages the further deposition of mud, when the water flow is slowed by the stems. Places which for some reason were slightly lower than the surrounding mud tended to hold sea water, inhibiting the growth of plants and becoming the residual type of salt pan. There being no plant stems to encourage more accretion of mud on the floor of the pan, the difference in level between this and the surrounding marsh becomes even more pronounced—salt pans have characteristic overhanging edges, affording some shelter to animal life.

Meanwhile, the tides would continue to cover the marsh; consequently, after each high tide, the sea water had to drain away, and the channels which it used became the creeks which still dissect the salt marshes. If a creek is blocked by the sides collapsing or by a pathway running across it, it partially fills with mud and becomes an "interrupted creek" type of pan. In our study area we have one of each type, the easternmost being residual.

As already stated, no flowering plants will normally grow in the water of salt pans, although *Spartina anglica* will sometimes be found in the very shallow ones. Even algae are quite unusual, though filamentous green species are occasionally seen. The pieces of Fucoid algae (*F. spiralis* L. and *vesiculosus* L.) often found on the marsh are washed in from stony sections of the major creeks, where they grow quite abundantly.

Occasionally one comes across examples of pans which have been drained by a creek cutting back into them. Two of these have been found within $\frac{1}{2}$ km of the study area, both of them of the interrupted creek type. Unfortunately it has not been possible to determine when they were drained, but by comparison with the artificially emptied pan it would seem to be several, perhaps at least ten, years ago. They have assumed a saucer-like shape without the normal overhanging margins. *Puccinellia* is the dominant species in both (c 90%) with *Aster* and *Salicornia* also present in small numbers.

If a salt pan is affected by a rapid change, such as we engineered by cutting a drainage channel, the effect will be sudden, if not cataclysmic, on sedentary animal life such as *Arenicola* and *Scrobicularia*. It is known by the visible casts that the former was present, and must be assumed that the specimens in the pan died when the mud first dried and hardened; assumed, because finding out would have meant disturbing the mud surface.

On the other hand, mobile animals such as *Leander*, *Pomatoschistus* and *Orchestia* may well have escaped with the first outward rush of water. In either case the change is once and for all, and does not provide a very rewarding field for study; the only gradual change noticed has been the appearance of *Corophium*.

When the plant community is considered, however, there is much more to be recorded, and it is likely to be many years before the new sub-climax of the succession on the floor of the drained pan is reached. As mentioned above, there is evidence that the shape of the cross-section of the pan may alter, but a complete levelling-off may never occur. Although *Puccinellia* was by no means the first plant to appear, it is now established, but it would, of course, be dangerous to assume that it will necessarily become dominant as it has in the naturally drained pans.

Ranwell (1956), working in the Malltraeth Estuary, Anglesey, found that on a new Puccinellietum the grass was capable of producing circular patches between 120 & 150 cm in diameter in three or four years. Dalby (1970), in the Gann saltings, near Dale, Pembrokeshire, investigating pans drained by creeks cutting back, writes:

"When this happens the pan floor is colonised by *Puccinellia*, and the normal primary marsh sequence follows (unless the site is overwhelmed by *Halimione*). The earlier seral stages then occur at about 30 cm higher over Chart Datum than would be expected at the marsh front, because of the general raising of the marsh surface where the pans are situated."

There seem to be significant differences between this state of affairs and that obtaining in Wells, where *Puccinellia* appears to be a secondary coloniser, and where *Halimione* grows well only on the higher parts of the marsh. It is, of course, realised that we do not yet have enough data to warrant drawing firm conclusions from the Wells situation; it is intended to carry on the investigation for a number of years, and perhaps prepare another report later.

Appendix 1

Bird Species Associated with the Surrounding Marsh

(a) NESTING:

Oystercatcher *Haematopus ostralegus* L.
Redshank *Tringa totanus* (L.)
Black-headed Gull *Larus ridibundus* L.

(b) NOT NESTING:

Mallard *Anas platyrhynchos* L.
Shelduck *Tadorna tadorna* (L.)
Brent Goose *Branta bernicla* (droppings in study area)
Curlew *Numenius arquata* (L.)
Whimbrel *N. phaeopus* (L.)
Herring Gull *Larus argentatus* Pontopp.
Common Tern *Sterna hirundo* L.
Little Tern *S. albifrons* Pall.
Skylark *Alauda arvensis* L.
Carrion/Hooded Crow *Corvus corone* L.
Meadow Pipit *Anthus pratensis* (L.) Yarrell
Starling *Sturnus vulgaris* L.
Reed Bunting *Emberiza schoeniculus* (L.)
and many other accidentals.

Appendix 2

Measurements from which Figure 2 was prepared

(a) SW/NE LINE

Distance from Edge in cm:	0	20	40	60	80	100	120	140	160	180
	6.5	7.5	7.5	7.5	6.0	7.0	7.5	7.0	7.0	6.0
	200	220	240	260	280	300	320	330	(other edge)	
	7.0	9.0	8.0	8.5	9.5	10.5	9.0	8.5		

(b) SE/NW LINE

From edge:	0	20	40	60	80	100	120	140	160	180	200	220	240
Depth:	5.0	6.5	8.5	7.5	5.5	6.5	6.5	7.5	7.0	7.0	8.5	7.5	8.0
	260	280	300	320	340	360	380	400	(other edge)				
	8.0	7.5	6.5	7.0	7.5	6.5	8.5	8.0					

Acknowledgements

I should like to record my indebtedness to Dr. L. A. Boorman of the Nature Conservancy, for his invaluable guidance and comments and my gratitude to my wife for her help in collecting data and reading the manuscript. Dr. D. Ranwell of the Nature Conservancy was also kind enough to make material available to me.

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NOTES ON THE MOTHS OF HICKLING AND WHEATFEN BROADS, WITH A SYSTEMATIC LIST OF THE SPECIES

T. N. D. Peet

Introduction

The following comments and systematic list are designed to compare the moths of an open, coastal broad (Hickling) with that of a more inland and sheltered broad (Wheatfen). There has been no recent survey of the moths of Broadland since the advent of mercury-vapour light trapping, although a previous short note on Hickling moths by me ([1]) was published in 1963. A comprehensive and informative list by Ellis ([2]) in 1965, which included many pre-1939 records from Barton Broad by C. W. C. Gane, provides a base-line for subsequent studies and is also indicative of the wealth of lepidoptera present.

At Hickling, records have been made for fifteen years (to 1973), sampling being undertaken in two to three week spells intermittently throughout the year, with a gap from November to March. At Wheatfen, observations were made on most suitable nights from June 1971 to October 1972.

The method of collecting has been largely by mercury-vapour light. This gives a very good idea of local populations of moths, especially noctuids, but is less satisfactory for geometrids. The range of attraction by the light is limited, especially if dense cover surrounds the trap, as in a reed bed. Good results demand special weather conditions, a moonless, warm, still, damp night being the best. Several seasons of trapping are required before it can be accepted that the records for any area are fully comprehensive; thus, the Wheatfen list is not yet complete. In addition to light trapping, daytime collecting with a net and observations made at dusk have contributed to the records. Searching for larvae and pupae has proved very profitable in respect of reed-boring insects.

At Hickling most work has been done at Whiteslea Lodge, with occasional trapping at Hickling Staithe, Whiteslea Wood on Heigham Sounds, and on one occasion a trap has been mounted on a boat floating on the broad. The grazing marshes below broad level extending from Stubb Mill to Whiteslea Lodge are included in the survey. At Wheatfen, a mercury vapour trap has been run on marsh surrounded by woodland and also on the edge of an oak wood. In addition several microlepidoptera records come from a suction trap used to determine the insect prey of the Wheatfen bat population.

It is valuable to differentiate between the gross vegetational differences of the two localities for the moths reflect these factors. Hickling is still an open broad, with a large amount of water and the cutting of reed and clearing of dykes and channels has held in check the natural succession of reed bed to carr. At Wheatfen, the area of open water is relatively small and the evolution of reed to alder carr and thence to oak, beech and birch is marked, except in areas still kept clear by man. A survey of these factors is provided in Ellis ([3]).

The comments which follow are on the moths unique to Hickling, to Wheatfen, common to both sites, coastal wind-blown vagrants, and some comments on absent species which might still be noted. There is a check list of species noted so far.

Species found only at Hickling

There are over 70 species of macrolepidoptera found at Hickling but not at Whcatfen. There is a strong local colony of the Small elephant hawkmoth (*Deiliphila porcellus* L.). The larva feeds on Lady's Bedstraw and I have trapped up to a dozen specimens each June. The Small Chocolate Tip (*Clostera pigra* Hufn.) is a rare presumed resident only one specimen has been seen in July 1964. The males of the Oak Eggar (*Lasiocampa quercus* L.) make a fine display over the grazing marshes in July as they career along in hot sunshine searching for more sedentary females. The females come occasionally to light. The Fox (*Macrothylacia rubi* L.) follows a similar pattern to the Oak Eggar but is much less common. The Dotted Footman (*Pelosia muscerda* Hufn.) is unknown in the British Isles (apart from old Kentish records) except in broadland. At Hickling it is frequent to light not only the moth trap but to ordinary electric light and car headlamps. Specimens are most frequent during the first two weeks of August. The Small Marsh Footman (*Pelosia obtusa* H.-S) has only been taken twice in this country one of these occasions being at Hickling in 1963. It is a small moth and secretive in habit, and even where a colony is discovered it has proved very difficult to capture specimens. It must be one of our rarest native moths, (4). The Water Ermine (*Spilosoma urticae* Esp.) is a special wetland insect though not confined to broadland. It is frequent at Hickling and I have found the larvae on Great Water Dock. The Reed Leopard (*Phragmatoecia castaneae* Hubn.) Unlike the comment in Ellis list (q.v.) this insect is quite common for a space of ten days towards the end of each July. Only males come to the light trap the females may be found by lamplight resting in the top of reed plumes. There is a suggestion that the species was introduced to broadland at Ranworth in 1873 from Wicken but I can see no reason why the insect should not be regarded as a true broadland native, for Hickling can hardly have been investigated at all in the late nineteenth century. The Stout Dart (*Spaelotis ravida* Schiff.) is a very local moth, with occasional records scattered across the British Isles.

There is only one record from Norfolk since the last war, a specimen at Hickling in 1958. The Bordered Sallow (*Pyrria umbra* Hufn.) is seen each year usually as a single specimen. These may be wind blown from the coast, where its foodplant Rest Harrow grows.

The Wainscot family is of particular interest as most species are limited to wet habitats. There is a single record of the Mere Wainscost (*Arenostola fluxa* Hubn.) taken in July 1964. The moth is well known in Huntingdonshire and Cambridgeshire fens, where the larva feeds on Calamagrostis epigeios. This plant grows along dyke margins on the grazing marshes around the broad· I have searched for the moth subsequently but with no luck. In 1971 I took the first Hickling specimen of the Rush Wainscot (*Nonagria algae* Esp.) The larva of this Wainscot feeds in the stems of Bulrush (*Scirpus*) which is not now present at Hickling or Horsey, though there is a small amount at Martham. The larva is also known from Reedmace (*Typha* ssp.) The moth is common at Barton and may be extending its range. Webb's Wainscot (*Nonagria sparganii* Esp.) exists at low density at Hickling the larva feeding in Reedmace or Iris. No examples were seen between 1965 to 1971. The Silky Wainscot (*Coenobia rufa* Haw.) is infrequent at Hickling though not confined to broadland. 1973 saw the first record of the Obscure Wainscot (*Leimania obsoleta* Hubn.) a local East Anglian and Thames valley moth.

The Crescent Striped (*Apamea oblonga* Haw.) is a moth locally common in brackish water regions and two examples have been noted at Hickling. The Dusky Sallow (*Eremobia ochroleuca* Schiff) is best known from the chalkhills of southern England. It appears to exist at low density along the East Anglian coast and each year two or three are noted at Hickling. Haworth's Minor (*Calaena haworthii* Curt.) flies by day over its foodplant Cottongrass, both moth and foodplant occur on the grazing marshes around the broad. The Silver Barred (*Eustrotia bankiana* Fab.) is virtually confined in this country to Wicken Fen yet two examples have been seen at Hickling in the past ten years. The Rosy Wave (*Scopula emutaria* Hubn.) is a local marsh insect and is occasional at Hickling. A single example of the Dark Bordered Beauty was taken in 1972. This is chiefly a northern insect though odd examples have been taken in Norfolk in the past.

Species found only at Wheatfen

There are over 40 species of macrolepidoptera found at Wheatfen but not at Hickling. Most of them have larvae which feed on trees not found locally at Hickling. The Alder Kitten (*Harpyia bicuspis* Borkh) appeared as a single specimen at Wheatfen in 1972. It is a rare moth over its whole range, and has been recorded once before from broadland at Wroxham some years ago. The Lobster Moth (*Stauropus fagi* L.) has occurred twice. The larva is a beech feeder and the trap at Wheatfen was sited twenty yards from a row of beech trees. An oak feeder is the Frosted Green (*Polyploca ridens* F.) of which several appeared in early May 1972. It will probably be found at Hickling in the future. The beautiful Black Arches (*Lymantria monacha* L.) is another oak feeder and ten specimens including a female have been noted. The species has some marked varieties ranging from pure black to nearly white. In the early autumn the Pale Oak Eggar (*Trichiura crataegi* L.) has been an occasional visitor not found at Hickling. Ellis notes it as rare. The larva of the Leopard (*Zeuzera pyrina* L.) feeds in branches and stems of trees and shrubs, and takes two or three years to mature. The adult has been seen occasionally at Wheatfen. An unusual record has been a single record of the Heath Rustic (*Amathes agathina* Dup.) in September 1972. The larva feeds on heather and the species is not typical of broadland. The Varied Coronet (*Hadena compta* Schiff.) only appeared as a resident in the British Isles in 1948 at Dover ([5]), but since then has spread extensively northwards. The larva feeds on Sweet William. I have seen one specimen in Norwich and a further one at Wheatfen in 1972. Other observers have recorded it throughout Norfolk ([6]). A former rarity now found more commonly since the advent of light trapping is the Alder moth (*Apatele alni* L) and a single example was seen in 1972. It has been noted near Potter Heigham in 1968 ([7]). Local Figwort and Mullein (both Hoary and Common) support larvae of the Mullein Shark (*Cucullia verbasci* l.) and adults were seen in May 1972. In the autumn the Brindled Green (*Dryobotodes eremita* Fab.) the Large Ranunculus (*Antitype flavicincta* Schiff.) and the Orange sallow (*Tiliacea citrago* L.) have been taken. Larvae of these species are found respectively on oak, low herbaceous plants and lime. Both the Large Ranunculus and Orange Sallow occur in the centre of Norwich. The Beautiful Hook-tip (*Laspeyria flexula* Schiff.) is a lichen feeder and fairly frequent to light in July. A single example of the Streak (*Chesias legatella* Schiff.) which feeds on Broom has been noted. Broom is a hedgerow and garden plant at Wheatfen.

One of the earliest insects of the year to appear is the Pale Brindled Beauty (*Phigalia pilosaria.*) The larva is polyphagous and doubtless the insect will turn up at Hickling.

Species found at Wheatfen and Hickling

Five species of Hawk moth are to be found at both localities. The Lime Hawk (*Mimas tiliae* L.) is the scarcest, only one specimen having been seen at Hickling and only two at Wheatfen. The Eyed and Poplar Hawks (*Smerinthus ocellata* L., *Laothoe-populi* L.) are very common, as is the Large Elephant (*Deilephila elpenor* L.) An example of the large ichneumon fly *Amblyjoppa proteus* Christ. was bred from a Hickling larva of the Large Elephant in 1971. The Puss (*Cerura vinula* L.) is common as is the Sallow Kitten (*Harpia furcula* Clerck.) The latter is double brooded and has been bred from a larva on sallow by E. A. Ellis at Wheatfen. The common Prominent moths are present in both localities. The Chocolate-tip (*Clostera curtula* L.) is double brooded and fairly frequent. The beautiful Peach blossom (*Thyatira batis* L.) is very occasional in both localities. The December moth (*Poecilocampa populi* L.) appears earlier than its name suggests and males have been seen in October at Hickling. The Drinker (*Philudoria potatoria* L.) is very common and larvae may be found on grass and frequently on reed in the spring. The Lappet (*Gastropacha quercifolia* L.) is never common. The Emperor (*Saturnia pavonia* L.) flies in late April and only females appear to come to light. The larvae have been found feeding on bramble on marsh walls in July and August. Four Hooktips, the Oak, Pebble, Scalloped and the Chinese Character (*Drepana binaria* Hufn. *D. falcataria.* L., *D. Lacertinaria* L., and *Cilix glaucata* Scop.,) occur commonly. Oak and birch are their chief foodplants and all except the Oak Hooktip are double brooded. The beautiful pink Rosy Footman (*Miltochrista miniata*) whose larvae feed on lichens is common at both sites. The Round-winged Muslin (*Comacla senex* Hubn.) swarms at dusk and to light on warm July evenings and the emergence continues over a period of one month. The Goat (*Cossus cossus* L.) occurs occasionally at light and larval borings have been detected in old sallow trunks. The large group of Noctuids contain few surprises common to both localities, but it is worth discussing the Wainscot group in detail. The Common Wainscot (*Leucania pallens*) is not as plentiful as its name implies. It is double brooded, flying in July and early September. The Smoky wainscot (*L. impura.* Hubn.) is easily the commonest of the family. The Southern Wainscot (*L. straminea* Treit.) found in July is frequent and varied, some examples having the forewings heavily streaked with black. The Striped Wainscot (*L. pudorina* Schiff.) is not striped at all, and together with the Shoulder-striped Wainscot (*L. comma* L.) is one of the earliest of the family to appear, at the end of June. Both the Clay Wainscot (*L. lithargyria* Esp.) and the Brown line Bright-eye (*L. conigera* Schiff.) are not limited to wet places, and both are frequent. In late September the Large Wainscot (*Rhizedra lutosa* Hubn.) flies, an insect notable for great variation in size, with wingtip spread between 35mm and 55mm. Fenn's Wainscot (*Arenostola brevilinea* Fenn) is common at Hickling and scarce at Wheatfen. This is purely a Broadland insect, and an aberration of the typical form occurs without a black streak at the base of the forewing: ab. *sinelinea* Farn. This is at a frequency of 1:30 specimens at Hickling. The Fen Wainscot (*Arenostola phragmitidis* Hubn.) is common at both localities and is another reed feeder. The Bulrush Wainscott (*Nonagria typhae* Thunb.) is common and the pupae are easy to find in August

by searching for the bored exit holes low down in the stems of reedmace. The dark brown form (*ab. fraterna* Treit.) occurs at 1:15 of all examples seen. The Twin-spotted Wainscot (*Nonagria geminipuncta* Haw.) and the Brown Veined Wainscot (*Nonagria dissoluta* Treit.) are both common, and pupae may be found in reedstems often two or three in one stem. The Silky Wainscot (*Chilodes maritima* Tausch.) is only occasional at Wheatfen, but more frequent at Hickling where three notable varieties are seen. *Ab. nigristriata* Staud., frequent: *ab. bipunctata* Haw, uncommon: and *ab. wismariens is* Schmidt which is rare. These forms and examples of other Wainscots may be seen in a small collection in the care of the Trust warden at Hickling.

The Double lobed (*Apamea ophiogramma* Esp.) is a local moth, but common at both localities in August. The Old Lady (*Mormo maura* L.) has declined in numbers all over the British Isles in recent years and is only occasional in Broadland. Not more than three specimens have been noted in any one season. The Reed Dagger (*Simyra albovenosa* Borkj.) is a fenland insect which is frequent at both sites. The larvae may be found on reed leaves and Great Water Dock and the moth is double brooded. Ellis' list mentions the reddish form *ab ochraceae* Tutt as common but I have never seen it.

Of the autumnal Sallow group of moths the Centre-Barred Sallow (*Atethemia xerempelina* L.) is uncommon, the first Hickling specimen only noted in 1972. The Cream bordered Green Pea (*Earias clorana* L.) is a tiny moth whose larvae feed on sallow. It becomes rubbed soon after emergence and is rarely seen in good condition. The Silver Hook (*Eustrotia uncula* Clerck.) is a local wetland moth occasional at both localities and also found in dune slacks at Horsey.

Recent work ([8]) has succeeded in separating two species from the single one previously called the Gold Spot (*Plusia festucae* L.) *Plusia gracilis* Lempke is the more recent discovery and both species occur at Wheatfen and Hickling. *P.gracilis* is paler and smaller than *P.festucae*, and emerges earlier.

In the autumn the large Red Underwing (*Catocala nupta* L.) flies, both to light and in the daytime. It is particularly frequent at Wheatfen and on release from the trap in the morning spirals rapidly up into the sky until out of sight.

The Black neck (*Lygephila pastinum* Treits) is found flying by day and night locally wherever its foodplant Tufted Vetch grows. The tiny Pinlon streaked Snout (*Schrankia costaestrigalis* Steph.) is common for a short period at the end of July and was only first noted in 1967: it had probably been overlooked before. The Fan-foot (*Zanclognatha cribrumalis* Hubn.) is a local fenland speciality and more common at Hickling than Wheatfen.

The Brown Scallop (*Philereme transversata* L.) feeds on Buckthorn which grows on marsh walls and in local hedgerows. The moth is rare here. The Oblique Carpet (*Orthonama lignata* Hubn.) is a common marsh insect, double brooded with the second generation markedly smaller than the first. The larva feeds on bedstraw. The Valerian Pug (*Eupethicia valerianata*) is occasional at both sites but so small that it is easily missed.

Migrants

The commonest migrant is undoubtedly the Silver Y (*Plusia gamma* L.) which appears in hordes in late July and August. I have taken over 300 in one

night on occasions. None of the spectacular migrant hawkmoths have been noted at Hickling, but the Convolvulus Hawk (*Herse convolvuli* L.) was seen on a gatepost near Surlingham in 1971. A larva of the rare Spurge Hawk (*Celerio euphorbiae* L.) was found at Martham, only two miles from Hickling in 1952, and was reared successfully ([9]). The large Great Brocade (*Eurosis occulta* L.) appeared as two specimens in August 1964 at Hickling, on the same dates as specimens appeared elsewhere in the country ([10]). This species is resident in the British Isles but only in Scotland, and the Continental and British forms have a different ground colour. In August 1963 a single example of the Angle-Striped Sallow (*Enargia palacea* Esp.) was taken. This species is known to migrate and has its resident headquarters in the Midlands. A specimen of the Gem (*Nycterosea obstipata* F.) was taken at Horsey Hall in 1966, this is a well known migrant. Other common migrants are the Dark Sword-grass (*Agrotis ipsilon* Hufn.), and the Pyrale *Udea martialis* (L.).

Wind-Blown Coastal Vagrants

There are a few noteworthy records from Hickling indicating its relative nearness to the coast. An on-shore wind brings occasional examples of sand dune insects through to the broad.

A single example of the Pigmy Footman (*Eilema pygmaeola* Doubl.) was noted in 1969. This is a rare moth known from the Kent and Norfolk coasts, and has not in fact been recorded from Norfolk for many years. It is probable that no-one has bothered to look for it. A specimen of Archers Dart (*Agrotis vestigialis* Hufn.) was taken in 1971 and a second in 1972. This is chiefly a sand-hill insect, though also found inland on the Breck. Separate light trapping at Sea Palling has shewn the species to be resident there and there is no doubt that the coast is the source of the Hickling specimens. Two species of sand dune wainscot have appeared as occasional specimens at Hickling, the Shore Wainscot (*Leucania litoralis* Curt.) whose larva feeds on Marram Grass, and the Lyme-Grass (*Arenostola elymi* Treits.) whose name indicates its food plant. This is one of the most southerly records of the Lyme grass whose distribution extends up the East Coast to Scotland. There is a strong colony of the Lyme Grass on the dunes at Sea Palling.

Some Absent Species

There are certain absent marsh species which may be anticipated in the future. The splendid Clifden Nonpareil (*Catocala fraxini* L.) was for a time resident at Barton, it could well colonise the carr at Wheatfen. The wetland Scarce Burnished Brass (*Plusia chryson* Esp.) whose larva feeds on Hemp Agrimony has been noted from the River Wissey near Lynford: it should eventually be found in broadland ([11]). There is a marked similarity between the moths of fenland and those of broadland despite the geographical separation of the intervening Breck and agricultural central Norfolk. Ellis notes the frequent occurrence of the Scarce Vapourer (*Orgyia recens* Hubn.) at Wheatfen before the war, but the insect is now very scarce throughout all its old haunts. It may yet reappear on the broads. The Marsh Pug (*Eupethecia pygmaeata* Hubn.) may appear, its larva feeds on Stitchwort.

An elusive prize of broadland is the Tineid *Olethreutes doubledayana* Barr, whose larva feeds on Marsh Pea. The foodplant is not common and does not occur at all at Hickling. But there is a good colony of Marsh Pea at Wheatfen and an intensive search for the moth is needed.

Acknowledgements

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LIST OF SPECIES

H. — Hickling W. — Wheatfen

Arranged according to Kloet and Hincks *A Check List of British Insects: Part 2. Lepidoptera*, Royal Entomological Society of London, 1972.

HEPIALIDAE
H W *Hepialus humuli*
H W *lupulinus*
W *fusconebulosa*

INCURVARIIDAE
W *Nepatopogon swammerdamella*

COSSIDAE
H *Phragmataecia castaneae*
W *Zeuzera pyrina*
H W *Cossus cossus*

ZYGAENIDAE
H *Adscita statices*
H *Zygaena trifolii*

TINEIDAE
W *Triaxomera parasitella*

GRACILLARIIDAE
W *Caloptilia elongella*
W *Parornix anglicella*
W *devoniella*
W *Phyllonorycter harrisella*
W *quercifoliella*
W *sorbi*
W *blancardella*
W *viminetorum*
W *maestingella*
W *alnifoliella*

YPOMOMEUTIDAE
W *Argyresthia conjugella*
H *semifusca*
H W *Yponomeuta padella*
W *Ypsolopha parenthesella*
W *ustella*
W *Plutella xylostella*
W *Eidophasia messingiella*

ELACHISTIDAE
W *Elachista luticomella*

OECOPHORIDAE
H W *Endrosis sarcitella*
W *Carcina quercana*
W *Diurnea fagella*
H *Agonopteryx heracliana*
H *cnicella*
H *subpropinquella*
W *alstroemeriana*
H *arenella*
W *ocellana*
H W *angelicella*
H *yeatiana*

GELECHIIDAE
W *Metzneria metzneriella*
W *Rhynchopacha mouffetella*
W *Hypatima rhomboidella*
W *Brachmia gerronella*
H W *rufescens*

MOMPHIDAE
H W *Mompha ochraceella*
W *propinquella*

TORTRICIDAE
H *Cydia succedana*
W *jungiella*
H *Spilonota ocellana*
H W *Eucosma hohenwartiana*
W *Epiblema turbidana*
H *cynosbatella*
W *uddmanniana*
H *trimaculana*
H *roborana*
H *Epinotia nisella*
H W *Endothenia quadrimaculana*
H W *Olethreutes lacunana*
H *Pandemis corylana*
W *cerasana*
H W *Archips oporana*
W *Aphelia paleana*
H W *Clepsis spectrana*
W *Lozotaenia forsterana*
W *Pseudargyrotoza conwagana*
H *Cnephasia stephensiana*
W *Tortricodes alternella*
W *Aleimma loeflingiana*
W *Tortrix viridana*
W *Croesia holmiana*
W *Acleris latifasciana*
W *comariana*
H *variegana*
H *lorquiniana*

COCHYLIDAE
W *Agapeta hamana*
W *zoegana*
H *Aethes cnicana*
H W *Eupoecilia angustana*

PYRALIDAE
H W *Chilo phragmitella*
H W *Chrysoteuchia culmella*
W *Crambus pascuella*
H W *pratella*
H W *perlella*
H *Agriphila selasella*
H *tristella*
W *Catoptria falsella*
H *Schoenobius gigantella*
H W *forficella*
H *Acentria nivea*
H *Scoparia arundineta*
H W *ambigualis*
W *Nymphula nymphaeata*
H W *Parapoynx stratiotata*
H *Cataclysta lemnata*
H W *Evergestis forficalis*
H W *pallidata*
H W *Eurrhypara hortulata*
W *lancealis*
H W *coronata*
W *Ebulea crocealis*
H W *Nascia cilialis*
H W *Udea olivalis*
H *ferrugalis*
H W *Nomophila noctuella*
H W *Pleuroptya ruralis*
W *Pyralis farinalis*
W *Aglossa pinguinalis*
H W *Aphomia sociella*
H *Eurhodope suavella*
W *advenella*
H *Oncocera palumbella*
H W *formosa*
H W *Phycita roborella*
W *Myelois cribrella*
W *Homoeosoma nebulella*

PTEROPHORIDAE
H W *Pterophorus pentadactyla*
H *Adaina microdactyla*

LASIOCAMPIDAE

H W *Poecilocampa populi*
W *Trichiura crataegi*
H W *Malacosoma neustria*
H *Lasiocampa quercus*
H *Macrothylacia rubi*
H W *Philudoria potatoria*
H W *Gastropacha quercifolia*

SATURNIIDAE

H W *Saturnia pavonia*

DREPANIDAE

H W *Falcaria lacertinaria*
H W *Drepana binaria*
H W *falcataria*
H W *Cilix glaucata*

THYATIRIDAE

H W *Thyatira batis*
H W *Habrosyne pyritoides*
H *Ochropacha duplaris*
H *Achlya flavicornis*
W *Polyploca ridens*

GEOMETRIDAE

H W *Alsophila aescularia*
W *Pseudoterpna pruinata*
H W *Geometra papilionaria*
W *Comibaena pustulata*
H W *Hemithea aestivaria*
H W *Timandra griseata*
H *Scopula imitaria*
H *emutaria*
H W *Idaea biselata*
W *seriata*
H W *dimidiata*
H *emarginata*
H W *aversata*
H W *Orthonama vittata*
H W *Xanthorhoe spadicearia*
H W *ferrugata*
H W *montanata*
H W *fluctuata*
W *Scotopteryx chenopodiata*
H W *Epirrhoe alternata*
H W *Anticlea badiata*
W *derivata*
H *Pelurga comitata*
H W *Eulithis testata*
W *mellinata*
H *pyraliata*
W *Ecliptopera silaceata*
W *Chloroclysta citrata*
H W *truncata*
H *Cidaria fulvata*
W *Plemyria rubiginata*
W *Thera obeliscata*
W *Colostygia pectinataria*
H W *Hydriomena furcata*
H W *Rheumaptera undulata*
H W *Philereme transversata*
H W *Epirrita dilutata*
W *christyi*
W *Operophtera brumata*
H W *Perizoma alchemillata*
H *flavofasciata*
H W *Eupithecia valerianata*
H W *centaureata*
H *absinthiata*
H *vulgata*
H *tripunctaria*
H *icterata*
H *simpliciata*
W *abbreviata*
H *Chloroclystis v-ata*
H W *rectangulata*
H *Anticollix sparsata*
W *Chesias legatella*
H *Pteraphorapteryx sexalata*
H W *Abraxas grossulariata*
H W *Lomaspilis marginata*
H *Semiothisa liturata*
H *wauaria*
H W *Petrophora chorosata*
W *Plagodis dolabraria*
H W *Opisthograptis luteolata*
H W *Epione repandaria*
H *paralellaria*
W *Apeira syringaria*
H W *Ennomos quercinaria*
H W *alniaria*
H W *fuscantaria*
W *erosaria*
H *Selenia dentaria*
H W *tetralunaria*
H W *Odontopera bidentata*
H W *Crocallis elinguaria*
H W *Ourapteryx sambucaria*
H W *Colotois pennaria*
W *Apocheima pilosaria*
H W *Lycia hirtaria*
H W *Biston strataria*
H W *betularia*
W *Agriopis leucophaearia*
W *aurantiaria*
H W *marginaria*
W *Erannis defoliaria*
W *Alcis repandata*
H W *Ectropis bistortata*
H *Aethalura punctulata*
H W *Cabera pusaria*
H W *exanthemata*
H *Lomographa bimaculata*
W *Theria rupicapraria*
H W *Campaea margaritata*

SPHINGIDAE
H W *Sphinx ligustri*
H W *Mimas tiliae*
H W *Smerinthus ocellata*
H W *Laothoe populi*
H W *Deilephila elpenor*
H *porcellus*

NOTODONTIDAE
H W *Phalera bucephala*
H W *Cerura vinula*
W *Harpyia bicuspis*
H W *furcula*
W *Stauropus fagi*
H W *Notodonta dromedarius*
H W *Eligmodonta ziczac*
H W *Pheosia gnoma*
H W *tremula*
H W *Ptilodon capucina*
H *Ptilodontella cucullina*
H W *Pterostoma palpina*
H *Drymonia dodonaea*
H W *ruficornis*
H *Clostera pigra*
H W *curtula*
H *Diloba caeruleocephala*

LYMANTRIIDAE
H *Orgyia antiqua*
H W *Dasychira pudibunda*
H W *Euproctis similis*
W *Leucoma salicis*
W *Lymantria monacha*

ARCTIIDAE
H W *Thumatha senex*
H W *Miltochrista miniata*
H *Pelosia muscerda*
H *obtusa*
H W *Eilema griseola*
H *pygmaeola*
H W *lurideola*
H W *Arctia caja*
H W *Spilosoma lubricipeda*
H W *luteum*
H *urticae*
H W *Phragmatobia fuliginosa*
H W *Tyria jacobaeae*

NOLIDAE
H *Nola cucullatella*

NOCTUIDAE
H *Euxoa tritici*
H W *nigricans*
H *Agrotis vestigialis*
H W *segetum*
H W *exclamationis*
H W *ipsilon*
H W *puta*
H W *Axulia putris*
H W *Ochropleura plecta*
H W *Noctua pronuba*
H W *comes*
H W *fimbriata*
H W *ianthina*
H *interjecta*
H *Spaelotis ravida*
H W *Graphiphora augur*
H *Peridroma saucia*
H W *Diarsia mendica*
H *brunnea*
H W *rubi*
H W *Xestia c-nigrum*
H W *ditrapezium*
H W *triangulum*
H W *baja*
H *sexstrigata*
H W *xanthographa*
W *agathina*
H W *Naenia typica*
H *Eurois occulta*
W *Anaplectoides prasina*
H W *Cerastis rubricosa*
H W *Discestra trifolii*
H W *Polia bombycina*
W *hepatica*
H W *Mamestra brassicae*
H W *Melanchra persicariae*
H *Lacanobia w-latinum*
H W *thalassina*
H W *suasa*
H W *oleracea*
H W *Ceramica pisi*
H *Hecatera bicolorata*
H *Hadena rivularis*
W *perplexa*
W *compta*
W *confusa*
H W *bicruris*
H W *Cerapteryx graminis*
H *Tholera cespitis*
H W *Orthosia cruda*
W *gracilis*
H W *stabilis*
H W *incerta*
H W *gothica*
H W *Mythimna conigera*
H W *ferrago*
H W *pudorina*
H W *straminea*
H W *impura*
H W *pallens*
H *litoralis*

H *obsoleta*
H W *comma*
H W *Senta flammea*
H *Cucullia chamomillae*
H *umbratica*
W *verbasci*
W *Cleoceris viminalis*
W *Lithophane semibrunnea*
H W *ornitopus*
H W *Xylocampa areola*
H W *Allophyes oxyacanthae*
H W *Dichonia aprilina*
W *Dryobotodes eremita*
H *Blepharita adusta*
W *Polymixis flavicincta*
W *Conistra vaccinii*
H W *Agrochola circellaris*
H W *lota*
H W *macilenta*
H W *helvola*
H W *litura*
H W *lychnidis*
H *Parastichtis suspecta*
H W *Atethmia centrago*
H W *Omphaloscelis lunosa*
W *Xanthia citrago*
H W *togata*
H F *icteritia*
W *gilvago*
H W *Acronicta leporina*
W *alni*
H W *tridens*
H W *psi*
H *Acronycta rumicis*
H W *Simyra albovenosa*
H *Cryphia domestica*
H W *Amphipyra pyramidea*
H W *tragopogonis*
H W *Mormo maura*
H W *Dypterygia scabriuscula*
H W *Rusina ferruginea*
H *Thalpophila matura*
H W *Euplexia lucipara*
H W *Phlogophora meticulosa*
H W *Ipimorpha subtusa*
H *Enargia paleacea*
H *ypsillon*
H W *Cosmia trapezina*
W *pyralina*
H W *Apamea monoglypha*
H W *lithoxylaea*
H *oblonga*
H *crenata*
H *remissa*
H W *unanimis*
H W *sordens*
H W *ophiogramma*
H W *Oligia strigilis*
H W *fasciuncula*
H W *Mesoligia furuncula*
H *literosa*
H W *Mesapamea secalis*
H W *Photedes minima*
H *elymi*
H *fluxa*
H W *pygmina*
H W *brevilinea*
H *Eremobia ochroleuca*
H W *Luperina testacea*
H *Amphipoea oculea*
H W *Hydraecia micacea*
H W *Gortyna flavago*
H *Celaena haworthi*
H W *leucostigma*
H W *Nonagria typhae*
H W *Archanara geminipuncta*
H W *dissoluta*
H *sparganii*
H *algae*
H W *Rhizedra lutosa*
H W *Arenostola phragmitidis*
H *Coenobia rufa*
H W *Hoplodrina alsines*
H W *blanda*
H W *Caradrina morpheus*
H *clavipalpis*
H W *Chilodes maritimus*
H *Pyrrhia umbra*
H W *Eustrotia uncula*
H *Deltote bankiana*
H W *Earias clorana*
W *Bena prasinana*
W *Pseudoips fagana*
H W *Diachrysia chrysitis*
H W *Polychrysia moneta*
H W *Plusia festucae*
H W *putnami gracilis*
H W *Autographa gamma*
H W *pulchrina*
H W *jota*
H W *Abrostola triplasia*
H W *Catocala nupta*
H W *Lygephila pastinum*
H W *Scoliopteryx libatrix*
W *Laspeyria flexula*
H W *Rivula sericealis*
W *Hypena proboscidalis*
H W *Schrankia costaestrigalis*
W *Polypogon tarsipennalis*
W *nemoralis*
HW *Macrochilo cribrumalis*

WEATHER SUMMARIES FOR 1973 & 1974

By T. B. Norgate

Pressure on space has necessitated combining two years into one report and to list the weather features statistically as far as possible—rather than treating them descriptively thus:—

NORFOLK WEATHER

	MEAN TEMPERATURES			SUNSHINE			RAINFALL		
	1973 °C	1974 °C	10-yr. Avge. °C	1973 Hrs.	1974 Hrs.	10-yr. Avge. Hrs.	1973 mm	1974 mm	10-yr. Avge. mm
Jan.	3.9	5.1	3.3	39	63	37	20.1	42.2	45.7
Feb.	3.5	5.2	3.4	77	66	61	27.6	62.7	44.6
March	6.1	5.7	5.1	128	105	111	12.6	21.0	41.7
April	6.9	7.9	7.4	158	166	139	71.9	3.3	54.9
May	11.4	10.7	11.5	188	209	185	52.4	15.8	51.8
June	14.9	13.5	14.0	283	196	191	24.7	36.5	47.7
July	15.5	15.0	15.7	153	169	172	94.0	55.9	68.3
August	16.3	15.5	15.8	208	190	171	18.2	76.0	56.6
Sept.	14.3	12.4	13.8	183	167	148	90.8	67.1	49.7
Oct.	8.9	7.3	10.8	109	75	102	41.2	135.5	50.2
Nov.	5.0	6.1	6.5	109	52	66	25.1	92.0	83.0
Dec.	4.1	7.3	3.7	61	41	40	36.4	43.1	64.0
Year	9.2	9.3	9.2	1676	1499	1423	515.0	651.1	658.2

	NO. OF AIR & GD. FROSTS			DAYS WITH THUNDER			DAYS WITH HAIL OR SNOW	
	1973 AF/GF	1974 AF/GF	10-Yr. Avge.	1973	1974	10-Yr. Avge.	1973 H/S	1974 H/S
Jan.	9/17	4/13	12.5/18.6	0	1	0	0/1	0/0
Feb.	9/19	4/13	10.6/18.5	1	1	.3	6/5	1/1
March	7/32	2/15	7.8/17.7	0	0	.5	0/0	0/3
April	2/13	2/9	2.7/11.6	1	1	1.5	6/3	0/0
May	0/3	2/8	.5/3.8	4	2	3.2	0/0	1/0
June	0/1	0/1	.1/1.2	4	3	2.3	0/0	2/0
July	0/0	0/0	0/.3	6	0	2.6	0/0	0/0
August	0/0	0/0	0/.1	1	3	2.3	0/0	0/0
Sept.	0/0	0/2	.1/.8	3	5	1.4	0/0	1/0
Oct.	0/11	0/10	.4/6.5	0	1	.4	1/0	0/0
Nov.	11/16	3/12	6.5/12.5	0	2	.5	1/4	1/0
Dec.	9/18	0/8	10.1/18.4	0	1	.2	1/1½	1/2
Year	47/120	17/91	51.3/110.0	20	20	15.2	15/14½	7/6

Notes 1 "AF/GF" Signifies number of days with Air Frost and Ground Frost respectively.

2 "H/S" Signifies number of days with Hail and Snow respectively, with ½ day counted when sleet fell.

The following notes are added in order to describe any unusual features throughout the two years.

	1973	1974
Highest max temp °C	16 Aug. 29.9°	15 Aug. 26.5°
Lowest max. temp. °C	30 Nov. 0.5°	1 Jan. 0.1°
Lowest min air temp. °C	1 Dec. 9.1°	1 Jan. 4.9°
Lowest min. ground temp °C	1 Dec. 14.3°	1 Jan. 7.5°
Wettest day at Taverham	15 July 29.1mm	4 July 23.0mm

1973. January, February and March continued the run of dry months from last August, with the slight exception of November 1972. The last half of March had only 1mm of rain, in the centre of the county, and it was the driest first quarter in the Waveney valley since 1858. Up to 37mm of snow fell in the third week of February.

A N.W. gale was experienced on the 2nd April, of storm force (Beaufort 11, i.e. over 56 knots or 64 m.p.h.) uprooting hundreds of trees and destroying probably as many caravans on the coast. Gusts up to 74 knots (85m.p.h.) were reported at Gorleston.

By June, some parts of the county were 60mm below average rainfall, but July thunderstorms yielded up to 85mm on the 19th/20th and 170mm for the month in the Fakenham-Wells area. However, Burlingham was *deficient* by more than that early in July, allowing for transpiration losses.

It was the driest August for 26 years and the sunniest for 14 years. Though September was wet, the rain was confined to the second half and what little October had was confined to the middle 10 days. November was the driest for 18 years and the sunniest for 48. December had not been sunnier for 14 years and on the 16th a force-9 gale, of at least 42 knots (nearly 50 m.p.h.) was recorded.

1974. The year began with the warmest January for 17 years, followed by a warm February which considerably helped during the power difficulties. The latter month was the first appreciably wet one since last September. A little snow fell at the end of February and early March. Drought conditions soon followed lasting well into April, Taverham with 3.3mm being the lowest for that month since Mr. Willis recorded 2.5mm in 1893. (This he called .10in.!).

May had only 2 sunless days and was the sunniest month of the year. With hot sunshine early in June the soil was sufficiently warmed to produce, unusually, four consecutive ground temperature minima *higher* than in the air.

Heavy thunderstorms in June produced over 75mm of rain from Sandringham to Northrepps while south Norfolk had only half as much. In August there were only 3 rainless days in mid-Norfolk; despite a wet month the year's total, so far, was still about 75mm below average.

Much of the rain in September was thundery and therefore erratic, whereas October was wet throughout and more than double the normal. Several places had over 150mm, much of it due to N.W. winds which made it the coldest October since 1917.

November was again wet all over the county, the 'driest' place being Docking with over 80mm but at least the cyclonic weather kept temperatures up. Despite current fears of a coming Ice Age, December was just as warm as October and the warmest December since 1934. The year finished up with most of the weather criteria just about "all square" with normals.

MEADOW SAFFRON IN NORFOLK

P. W. Lambley, Castle Museum, Norwich.

Meadow Saffron (*Colchicum autumnale*) is a plant which has been recorded from Norfolk in the nineteenth and early part of the twentieth century. All these records are from a restricted area in the heavy boulder clay country of South Norfolk. It is first mentioned in the Botanists Guide (1805) as being 'in a meadow at Pulham'. In the Flowering Plants and Birds of Harleston (1888) it was recorded as 'plentiful in the parish of Pulham St. Mary Magdalen' by the Rev. Spencer Fellows. There is also a record for the adjacent parish of Starston. In Nicholson's Flora of Norfolk (1914) there is an additional record from Burston made by Rev. J. W. Millard in 1908.

In recent years it has been seen in native woodland at Merton Park near Watton by Dr. Francis Rose but as there are a number of exotics e.g. *Lupinus* sp. and *Heracleum mantegazzianum* it seems likely that it was planted here.

As the Burston record was the last known record, the species was assumed to be extinct in the county as a native species. However, in 1974 a site was brought to the attention of the Norfolk Naturalists Trust by Lady Mann. In this site, in the parish of Scole, the *Colchicum* has been known for at least 90 years, and has been locally known as naked ladies. The plants are growing in three small meadows on heavy boulder clay which until recently were separated by high hedges. These meadows have been managed by cutting in late July when the leaves have withered and the hay either being put in the bullock pen or burnt if wet and decayed. Fertiliser has not been applied to the meadows nor have they been sprayed. During the last few years the three meadows have been made into one by the removal of the hedges and the ditches deepened. Some exotic trees have also been planted in the meadow e.g. *Cedrus* sp., and *Amelanchier* sp. In part of the meadow nearest a house a number of bulbs have been planted including *Fritillaria* and *Chionodoxa* sp. Nevertheless most of the meadow remains untouched and besides a very large population of *Colchicum* a number of other interesting plants occur including *Ophioglossum vulgatum*, *Listera ovata*, *Primula veris* and *Arum maculatum*. However *Orchis morio* an associate in some Suffolk sites appears to be absent.

It is curious that such a conspicuous plant should have remained unknown to botanists for so long, nevertheless I consider that this is a native site for *Colchicum* for the following reasons.

1. All the old records come from within a radius of 7 miles of this site.

2. That it has been known locally for so long (at least 90 years) and has acquired a local name in the village.

3. The meadow has a number of plants which are now rare in pastures in Norfolk e.g. *Ophioglossum*, *Listera ovata* and *Arum maculatum*.

In conclusion it is pleasing to report the discovery of a plant previously considered extinct in an apparently native site in the county.

Acknowledgements

The author wishes to thank Lady Mann for giving permission to visit the site and information about the history and management of the meadows.

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AMPHIBIA AND REPTILE RECORDS FROM NORFOLK

JOHN BUCKLEY

Introduction

Herpetology is the branch of zoology which deals with the study of amphibia and reptiles and the word herpetofauna has been coined to refer to species which belong to this group. The British Isles, excluding the Channel Isles, have only twelve indigenous species, one frog, two toads, three newts, three lizards and three snakes; ten of these species and one introduced species occur in Norfolk. Being a small group, unlike the birds, mammals, and plants, Norfolks' herpetofauna has received little attention in the past. Usually these species have only been cursorily mentioned in reports dealing with birds or mammals. In this paper all the records collected up to the end of 1974 have been gathered together and presented by species according to the 10km square of the National Grid in which they occurred.

Material and Methods

The first attempt to bring together information on the national distribution of the herpetofauna was made by Taylor (1948) in co-operation with the British Herpetological Society (B.H.S.). Updated versions of these distribution maps were published by Taylor in 1963. From 1965-70 the Biological Records Centre (B.R.C.), also in co-operation with the B.H.S., conducted a further national survey on a 10km. square basis and the provisional results were published in 1973. Taylor's work proved to be a valuable source of references for older Norfolk herpetofauna records and I am grateful to Henry Arnold (B.R.C.) for sending me photo copies of the Norfolk record cards. Recently more detailed studies have been made nationally to investigate reported declines in the common frog and the common toad (Cooke 1972a) and the warty newt, natterjack toad, sand lizard and smooth snake.

In the past 15 years two surveys have been organised to collect Norfolk herpetofauna records. The first was conducted by P. R. Banham in 1961 and it is referred to as the P.R.B. Survey in the text. During this survey records of both reptiles and amphibians were collected, mainly from members of the Society, and later a report was duplicated and sent to members. The second survey was organised by J. J. Sambrooke in 1967 (J.J.S. Survey) when he was a member of the Nature Conservancy's Staff in Norwich. The field work for his survey was carried out by primary schools and only amphibian records were collected. A copy of this report is retained by the Nature Conservancy, Norwich.

Although reports dealing with the local herpetofauna are few, records have been gathered from the following books and papers: Paget and Paget, 1834; Southwell, 1871; Miller and Skertchly, 1878; Clarke, 1897; Gadow, 1904; Patterson, 1905; Mottram, 1935; Taylor, 1948, 1963; and Ellis, 1965. In addition the following naturalists publications have proved a useful source of records; Transactions of the Norfolk and Norwich Naturalists Society, Bulletin of the Heacham and West Norfolk Naturalists Society, Bulletins of the Norfolk Young Naturalists and the Gresham Schools' Natural History Society. The bulk of the recent records used in this report have been sent to me over the past few years by members of the N. & N.N. Society

Two recent publications, *A Provisional Atlas of the Amphibians and Reptiles of the British Isles* edited by Henry R. Arnold (1973) and *The Changing Flora and Fauna of Britain* edited by D. L. Hawksworth (1974) have made it possible, in some cases, to evaluate importance of Norfolk's Herpetofauna on a national scale.

In this report the records have been organised by species and details of the most recent sightings in each 10km square are given. Other records for the same square have been abbreviated to parish and year. Distribution maps for each species show from where records have been received and perhaps more important where records are lacking. The distribution of rare species in Norfolk is now well known but knowledge of the abundance and distribution of commoner species is less complete. In the future the aim should be not only to collect more records to improve our knowledge of the distribution of the herpetofauna but also to monitor the numbers of each species at particular sites so that future changes in abundance can be detected.

The Warty or Great Crested Newt (*Triturus cristatus*)
This newt was described as common by T. Southwell (1871) but other writers make no comment as to its abundance until this century. Banham (1961) considered it to have a more local distribution than the common newt (*T. vulgaris*) and to be most frequent in the northern part of the county, Ellis (1965) described it as widely distributed in the ponds and marshy dykes bordering the broadland valleys.

The warty newt is easily distinguished from the two other species of indigenous newt by its soft warty skin which is black/brown above and orange, spotted with black, below. The fact that, in Norfolk, the warty newt is less frequently recorded than the common newt suggests that it is indeed less abundant. The Provisional Atlas of Amphibians and Reptiles of the British Isles Biological Records Centre (1973) shows that the common and warty newt have a similar distribution in England and Wales. In England both species are generally distributed but there are fewer records from Wales and the S.W. penninsula. The warty newt may be less abundant than the common or smooth newt because it is less catholic in its choice of breeding sites preferring reasonably deep ponds and chalk and clay rather than sandy soils Smith (1954). Prestt et al (1974) suggests that the warty newt has declined in abundance more severely than the common newt particularly in S.E. England.

Beebee (1973) blames collecting for the decline of the warty newt in S.E. England but it is generally assumed that newt populations decline with the loss of breeding sites. The more serious decline of the warty newt is attributable to the greater difficulty this species would encounter when trying to find a new pond for colonization, after a regular breeding site is lost. Known breeding sites for this species in Norfolk need careful documentation and conservation.

Triturus cristatus

TF 63. *1971 3rd July, Heacham. Dr. J. Wells.*
92. *1961 Brisley Green. Miss D. M. Maxey.*
94. *1961 Burnham Thorpe. Dr. Drake Briscoe.*
TG 00. *1932 28th May. Found in ponds at Wicklewood. E. A. Ellis.*
01. *1974 Two adult found at Hockering Wood. J. Buckley.*

02. *1971 Single specimen found under log Foxley Wood. R. E. Baker.*
03. *1952 Present around Holt. R. M. Holmes.*
04. *1967 Recorded at one site in this square. J. J. S. Survey.*
10. *1932 Earlham. Bawburgh 1964, 1971 specimens found under a log Wymondham. J. G. Goldsmith.*
11. *1933 Ringland, 1959 Alderford Common, 1964 Three specimens found under a log Felthorpe Marshes. J. Buckley & J. G. Goldsmith.*
12. *1961 One large male found under a discarded sack Buxton Heath. J. Buckley.*
14. *1939 Beeston & Sheringham Commons, 1973 Present and breeding Beeston Common. F. Farrow.*
20. *1963 Swainsthorpe, 1964 Dunston, 1964 Upper Stoke, 1974 Eaton, Norwich. E. A. Ellis.*
22. *1967 Recorded at one site in this square. J. J. S. Survey.*
30. *1974 Rockland St. Mary. E. A. Ellis.*
31. *1967 Recorded at one site in this square. J. J. S. Survey.*
42. *1969 Single adult Bramble Hills, Horsey. P. Buckley.*

TL 88. *1897 Thetford. W. G. Clark.*
89. *1961 West Tofts. P.R.B. Survey.*
90. *1965 Cranworth 1 specimen seen. A. L. Bull.*
98. *1973 4th August, two males and one female and one immature found under a log near Langmere. J. Buckley.*
99. *1974 Thompson Common, about 2 dozen four-legged tadpoles found. J. Buckley.*

TM 29. *1964 Shotesham, 7 males, 2 females and 2 immatures found in a pond Saxlingham Green, 3 specimens found under a log. J. G. Goldsmith.*

The Common or Smooth Newt (*Triturus vulgaris*)

This species of newt is the most frequently recorded of the three species in Norfolk and certainly the most numerous. The Paget's (1834) considered this newt to be, "not uncommon"; Southwell (1871) recorded it as common. Patterson (1905) records it as plentiful on the Bure Ronds in the neighbourhood of Acle, and Ellis considered it as common in ponds and ditches throughout the Broads area. Banham (1961) however, has indicated that it may have decreased in some areas.

Little is known about the changes in status of British newts. G. A. C. Bell (in litt.) believes that within the last 200 years the smooth newt must have increased because of the creation of small field ponds at the time of the enclosures. Now that small field ponds are being left to become overgrown or filled in presumably the smooth newt is declining again in numbers. Beebee (1973), whilst recording the decline of warty newts in some areas, could find "little evidence" of the decline the other two species. Prestt et al (1974) consider that the smooth newt has fared rather better than the warty or palmate newt over the last decade or so in England. The smooth newt can still be regarded as a common species in Norfolk.

Triturus vulgaris

TF 81. *1959 Castle Acre. N.C.M. Records.*
83. *1974 26th April one female and one male Syderstone common. J. Buckley.*
91. *1961 Beetley/Brisley, 1962 26th April, 6 specimens in pond near Beetley School. Miss D. M. Maxey.*
92. *1962 Brisley, 1963 April 3rd, two specimens in pond Brisley Hill. Miss D. M. Maxey.*
93. *1974 Three in garden pond, Gt. Snoring. Mrs. F. Wylam.*
94. *1971 Specimens in breeding condition Wells Pine Woods. P. R. Banham.*

TG 00. *1961 Morley St. Botolph. P.R.B. Survey.*
02. *1972-73 One hibernated under a pile of seed boxes at Foxley. A. L. Bull.*
03. *1952 Holt, 1959 Holt. N.C.M. Record.*
04. *1949-73 Specimens occasionally found dead on road by Snipe's Marsh Cley. R. A. Richardson.*
10. *1961 Hethersett, 1971 Wymondham, 1971 Mulbarton, 1972 Colney Hall, 1973 March, Mulbarton. R. E. Baker. 1974 Cringleford. P. Hart.*
11. *1961 Attlebridge, 1967 Costessey. J. Buckley & J. G. Goldsmith.*
12. *1961 Aylsham, 1973 Corpusty and Saxthorpe. Mrs. I. Brewster.*
14. *1973 Beeston Common. F. Farrow.*
20. *1969 Caistor St. Edmunds, 1971 Dunston, 1972 March, Thorpe, 1974 Eaton, Norwich. E. A. Ellis.*
30. *1973 Rockland St. Mary. E. A. Ellis.*
32. *1961 Ingham. P.R.B. Survey.*
40. *1972 June, one female found walking across the railway line near Berney Arms J. Buckley.*
41. *1972 Billockby, 1973 Acle, 1973 6th May, one female taken Burgh Common. R. J. Driscoll.*
42. *1961 Winterton Dunes, 1971 Waxham Cut, 1974 July, specimens found Winterton Dunes pool. J. R. Cremona.*
51. *1974 North Denes, Yarmouth. E. A. Ellis.*

TL 88. *1934 Thetford, 1961 Thetford Chase. P.R.B. Survey.*
89. *1961 West Toft and Lynford. P.R.B. Survey.*
90. *1960-7 seen fairly frequently at Cranworth. A. L. Bull.*
99. *1974 July, specimens Thompson Common. J. Buckley.*

TM 08. *1966 15th September, Great Fen, S. Lopham. B. Levey.*
09. *1973 six specimens Morley St. Botolph. C. Cuthbert.*
19. *1973 Flordon Common. E. A. Ellis.*
39. *1971 26th September, one specimen Hardley Floods. J. G. Goldsmith.*

Palmate Newt (*Triturus helveticus*)

The distribution of this species may not be perfectly known but it certainly appears to be rare in this county. Miller and Skertchly (1878) had no record of it being found in the fens and the only 19th century record for this species comes from Sparham. Patterson (1905) makes no reference to the palmate newt in his book *Nature in Eastern Norfolk*, but Ellis (1965) mentions it as occurring at Brumstead and Herringfleet.

The distribution of this species in Britain contrasts with that of the warty newt and smooth newt; it is widely distributed in Wales and the S.W. penninsula but relatively uncommon in Eastern England. The abundance of the palmate newt in Norfolk is consistent with the pattern in the distribution of this species throughout the British Isles.

Triturus helveticus

TG 01. *1870-71 Sparham F Norgate. Trans. Nor. & Norf. Nat. Soc. Vol. 1,p82.*
03. *1952 Recorded at Gresham School and near the river Glaven. R. M. Holmes.*
40. *1933 31st May. Five specimens taken from a dyke at Burgh Castle, near the Grange. E. A. Ellis.*
42. *1967 January. "Half a dozen Palmate Newts found hibernating in the rotten end of a ligger" Calthorpe Broad. J. J. Sambrooke.*

The Common Toad (*Bufo bufo*)

This species was formerly simply described as, "common" by Southwell in 1871.

Today it is still common and widely distributed, but it is less common than in the 1940's (Ellis, 1965). The decline in abundance has not been so dramatic as that of the common frog. Banham (1961) reports a decrease at seven sites, an increase at two and no change at ten. Cooke (1972a) considers that the common toad declines were probably spatially and temporally similar to those of the common frog.

Bufo bufo

TF 51. *1967 one site in this sqnare. J.J.S. Survey.*
61. *1962 April 11th, spawn Witton Woods, Bawsey. J. Winterton.*
62. *1936 & 1967 recorded in this square, 1971 Castle Rising. D. V. Ovenden.*
63. *1967 and 1969, 1972 4th April, one pair in amplexus seen crossing road, Ringstead J. G. Goldsmith.*
64. *1963 Holme, 1967 Hunstanton. P. R. Cobb.*
70. *1966 Stoke Ferry, 1967 at two sites. J.J.S. Survey.*
71. *1965 28th March, Castle Acre. F. H. Perrin.*
72. *1926 Grimston, 1967 at four sites. J.J.S. Survey.*
73. *1967 Docking. E. M. Daines.*
74. *1967 Holme Bird Observatory. P. R. Cobb.*
81. *1974 25th August, Litcham Common, J. Buckley.*
83. *1972 April 25th, 10 pairs plus spawn, Syderstone. D. L. Ovenden.*
84. *1973 Dykes near Holkham Bay, breeding. P. R. Banham.*
90. *1961 present, 1967 at 2 sites. J.J.S. Survey.*

M 91. *1967 at five sites, 1974 Dereham. Miss D. M. Maxey.*
92. *1961 Brisley, 1967 at one site. J.J.S. Survey.*
94. *1967 present at 2 sites, 1973 near Wells. P. R. Banham.*

TG 00. *1960-67 seen regularly Calvelly Hall Gravel Pit. A. L. Bull.*
01. *1962 7th April, one specimen and spawn, Bylaugh. S. E. Lodge. Miss D. M. Maxey.*
03. *1952 Holt, 1972 Briston & Corpusty, 1973 Holt. P. Hart.*
04. *1960 Salthouse, 1961 Bayfield, 1967 at 3 sites in this square, 1968 28th April, Cley. P. K. Kinnear.*
10. *1961 Hethersett, 1971 Mulbarton, R. E. Baker. 1972 Colney, 1973 Cringleford. E. T. Daniels.*
11. *1957 Drayton, 1961 Attlebridge, 1967 at 8 sites, 1974 Costessey. Miss E. M. Buttery.*
12. *1961 Aylsham, 1967 Aylsham/Blickling, 1967 at 6 sites in this square. J.J.S. Survey.*
13. *1967 at 3 sites, 1973 Corpusty. Mrs. I. Brewster.*
14. *1967 at one site, 1973 Beeston Common. F. Farrow.*
20. *1961 Stoke Holy Cross, 1970 84 road casualties Caistor St. Edmunds, 1974 Thorpe. Miss E. M. Buttery.*
21. *1961 Catton, Sprowston, 1967 recorded at 3 sites in this square. J.J.S. Survey.*
22. *1967 at 9 sites in this square. J.J.S. Survey.*
23. *1961 North Walsham, 1967 recorded at 6 sites. J.J.S. Survey.*
30. *1933 Strumpshaw, 1967 at 3 sites in this square. J.J.S. Survey.*
31. *1970 How Hill, Ludham, 1971 Hoveton, 1973 South Walsham, 1973 Large numbers breeding Upton Broad. G. Coupland.*
32. *1926 and 1961 Ingham, 1967 at 9 sites, 1971 Mill Farm, Happisburgh. M. W. Ferguson.*
41. *1961 Potter Heigham, 1967 Hemsby, 1968 Ormesby, 1968 Winterton, 1972 Acle, Burgh Common, Fishley Hall, 1973 Abundant at Fleggburgh. E. A. Ellis.*
42. *1967 at 3 sites, 1970 Horsey, 1971 Waxham, 1972 May, Winterton Dunes N.N.R. L. Bensley.*
50. *1936 Southtown, Gt. Yarmouth. E. A. Ellis.*
51. *1951/2 Caister-on-Sea, 1961 Caister. J. Woolston.*

TL 79. *1967 at one site in this square. J.J.S. Survey.*
88. *1897 Thetford, 1967 at 5 sites, 1972 Croxton, 13th July, two adults and hundreds of toadlets. E. Combe.*
89. *1961 West Tofts. N.N.N.S. record.*
98. *1963 East Wretham, 1973 4th August, one dead adult and young toadlets, Ringmere. J. Buckley.*
99. *1961 Thompson and Wretham, 1973 4th August young toad Stow Bedon Common. J. Buckley.*

TM 08. *1961 South Lopham, 1967 present at two sites. J.J.S. Survey.*
09. *1967 at one site, 1973 Attleborough and Morley St. Botolph. C. Cuthbert.*
18. *1967 recorded at two sites in this square. J.J.S. Survey.*
19. *1910 Flordon Common, 1961 Great Moulton, 1967 at one site in this square. J.J.S. Survey.*
28. *1967 two sites recorded in this square. J.J.S. Survey.*
29. *1961 Shotesham, 1967 recorded at 8 sites in this square. J.J.S. Survey.*
49. *1971 Fritton, Suffolk. R. Foster.*

The Natterjack Toad (*Bufo calamita*)

At one time Norfolk and Suffolk possessed numerous, and often very large, natterjack toad colonies along the coast and on suitable inland areas. The Pagets (1834) recorded this species as "common in gardens in and about the town (Yarmouth), and in dry heathy lanes at Belton, Oby and c." The situation was much the same when Arthur Patterson wrote his book *Nature in Eastern Norfolk* (1905), but Ellis (1965) records that "since the 1930's it has disappeared from many of its former haunts." E. A. Ellis (in litt) knew of 12 localities from Bawdsey to Holkham; all but 3 are now extinct. Southwell (1871) speaking of the whole of Norfolk considered the natterjack to be "more local than rare, being found abundantly in many places". In the west of the county Miller and Skertchly (1878) had specimens collected for them from Wooton and near Hunstanton. In 1961 Paul Banham had reports of only three colonies, two coastal and one inland. Now four colonies are known, two coastal and two inland. Dr. Beebee (1974) considers that all four colonies are declining and certainly natterjacks are less common at these sites than formerly. At the two coastal sites 1973 was a successful breeding season, but the situation at the inland sites is not really known.

In W. Europe the natterjack is widely distributed from sea level to 4,000ft., but in Britain it is now found only near sea level and it is confined to light sandy soils where shallow, unshaded pools, suitable for breeding, occur. At most of its sites in Britain the natterjack has declined, but the declines have been most severe at inland sites.

The last major inland area for natterjack toads was on the London Basin and Wealden Heaths. Studies by Corbett have shown that by 1972 all colonies were extinct except one, and that this colony was reduced from several hundred pairs to only four pairs. The colonies around Frensham and even the large population extending from Woking to Wisley are extinct. At an earlier date colonies in Dorset and S. Hampshire became extinct.

The main sites for this species in Britain are now the W. Lancashire Coast between Southport and Altcar, the Ravenglass Sand Dunes, and the North and South shores of the Solway Firth. Norfolk has two important sites.

The decline has been so dramatic that outside Norfolk there is only one natterjack colony in Southern and Eastern England (Beebee 1974).

The decline of the natterjack in southern Britain cannot be attributed to a single cause, but human interference is the major one. This species has suffered from destruction of habitat, collecting, gassing of rabbit burrows, fires, afforestation of heathland and drainage, and at coastal sites colonies have suffered from the increasing use of sand dunes by tourists. Ellis (in litt) points out that in eastern England whilst some habitat has been destroyed much of it still appears relatively undisturbed, and he suggests that contributory factors to the decline might be the severe winters of 1947, 1963 and the use of heavy machinery on the land.

Natterjacks in this country require shallow unshaded pools for spawning and tadpole development. Since the natterjack is confined to sandy habitats, the breeding pools frequently dry out before the natterjack tadpoles metamorphose, and a bad breeding season results. Sporadic breeding success has been a feature of natterjack colonies but now that colonies are becoming smaller and more confined a series of bad years could possibly render a colony non-viable (Prestt et.al. 1974).

The most up to date information, Beebee (1974) shows that most (4/5) of the remaining natterjack colonies in southern and eastern England are in Norfolk. Clearly it is of considerable importance that the Norfolk sites are given adequate protection and that measures are taken to encourage the breeding success of the toads. All four Norfolk colonies are at sites where there is no immediate threat of development, but this does not mean that the sites will remain suitable without active conservation. Adequate conservation measures have been taken at the sites in TF84 and TG42, but the colony in TF83 lacks a permanent breeding site. A number of temporary pools exist, but until a permanent pond is constructed breeding success will be erratic. The last record of newly metamorphosed young at this site is 1969 and a visit in the 1974 breeding season only revealed one old (?) male toad; but of course others may have been unobserved. All the evidence suggests that this colony is dying out, perhaps close to extinction, but the establishment of a permanent breeding pond could save the colony. The situation at the TF62 site is unknown Presst et. al. (1974) suggests that a re-introduction may have occurred there, but no details are given in their paper.

Bufo calamita

TF 62. *1973, 16th September. One adult specimen found at this site. R. J. Hornby.*
83. *1969, 29th July. Adults and juveniles seen at this site. A. L. Bull. 1969, 6th September, two newly metamorphosed young seen. P. R. Banham. 1974, R. Pullen.*
84. *1973 Successful breeding, more than 2,000 tadpoles completed metamorphoses. C. Johnson.*

TG 04. *1970/71 Cley East Bank, reports per J. G. Goldsmith.*
14. *1939 recorded on a species list for Beeston & Sheringham Commons. M. Dawnes.*
20. *1833 specimens found at Framingham Earl, where it was described as "formerly tolerably abundant." S. Woodward. Also found by S. Woodward "in the loose sand in the chalk pit near the Lunatic Asylam, Thorpe."*
21. *1833 several specimens taken at St. Faiths. Sam Woodward writing to J. E. Longdon.*
40. *Reedham colony probably extinct 1952, R. P. Bagnall-Oakley. Recorded in 1930 by F. H. Ashton. 1932 dozens seen in sunny hedgerow at Belton, E. Suffolk. E. A. Ellis.*

42. *1973 successful breeding year at this site, Nature Conservancy.*
51. *1960 August. One found on a rubbish heap at Caister-on-Sea. J. G. Goldsmith.*

Common Frog (*Rana temporaria*)

Undoubtedly the common frog breeds in every 10km square in the county and a lack of a record does not indicate an absence of frogs. Previous writers have recorded it as abundant until about the 1930's but it is interesting to note that Miller & Skertchly (1878) record it as, "not so abundant as formerly in the fens, because of drainage." The reasons for the post-1930 decline in this species, are not fully understood. Banham (1961) recorded a decline at fourteen sites in east and central Norfolk, no change at two sites and an increase at three sites. The 1967 survey organised by Sambrooke recorded a decline at ten sites and an increase at three sites. The present situation appears to be that the common frog is still widely distributed throughout the county, in some localities it is scarce, and only perhaps at a few sites, is it as common as it was 30 to 40 years ago.

Cooke (1972a) considers that in Norfolk a moderate decrease took place in the years 1956-60, a severe decrease in the five years 1961-1965, and a further moderate decrease from 1966-1970. Savage (1961) regarded that in the 1930's -1940's an average frog density would be 5 adults per acre. Cooke gives a value of 0.1 adult frogs/acre for Norfolk, and lower values for Huntingdonshire, Huddersfield area of Yorkshire, and the Isle of Wight. If these figures are to be taken as realistic, then the frog population has been reduced from something like 1/50th of its original size in the last 30 to 40 years.

Rana temporaria

TF 60. *1967 recorded at one site. J.J.S. Survey.*
61. *1967 recorded at 3 sites. J.J.S. Survey.*
62. *1966 Gaywood, 1967 recorded at 5 sites. J.J.S. Survey.*
63. *1967 present at one site. J.J.S. Survey.*
64. *1963, August, Hunstanton. A. Woodrow.*
70. *1960's seen Foulden Common. A. L. Bull.*
71. *1966 Petney Common, near Narrborough, 1967 recorded at three sites. J.J.S. Survey.*
72. *1967 recorded at 7 sites. J.J.S. Survey.*
73. *1967 April, Docking. E. M. Dams.*
74. *1967 19th June, Holme Bird Observatory. P. R. Clarke.*
83. *1967 at three sites, 1972 15th April spawn at Syderstone Common. D. L. Ovenden.*
84. *1967 recorded at 6 sites. J.J.S. Survey.*
90. *1961 Watton, 1967 recorded at 5 sites. J.J.S. Survey.*
91. *1961 East Bilney, 1964 East Dereham, 1967 Scarning Fen, 1967 recorded at 7 sites. J.J.S. Survey.*
92. *1961-62-65 Brisley, 1967 recorded at 8 sites. J.J.S. Survey.*
93. *1973 August 15th, froglets, Gt. Snoring. Mrs. Wylam.*
94. *1967 at 11 sites, 1973 Wells. P. R. Banham.*

TG 00. *1960 Runhall. P. R. Banham.*
01. *1967 recorded at 7 sites. J.J.S. Survey.*
02. *1967 recorded at one site. J.J.S. Survey.*
03. *1952 Holt, 1954 Bayfield, 1972 Briston/Corpusty, 1973 March, Holt. P. Hart.*
04. *1937 Kelling, 1961 Cley, 1967 at 5 sites, 1969 May, Cley to Salthouse. A. B. Barrett.*
10. *1961 Wymondham, Hethersett, 1971 Cringleford, Mulbarton, 1972 Keswick, 1973 21st March, spawning at Mulbarton. R. E. Baker.*

11. *1960 Attlebridge, 1965 Horsford, 1967 at 22 sites, 1969 Old Costessey. Biological Records Centre, Monkwood.*
12. *1932 Heydon, 1961 Aylsham, 1967 at 5 sites, 1969 April, breeding in new pool, Buxton Heath. J. Buckley.*
13. *1967 recorded at 11 sites. 1967 April, 40 clumps of spawn, Pond Hills. J. Buckley.*
14. *1967 recorded at one site. 1971 April 5th, spawn Beeston St. Lawrence. J. Buckley.*
20. *1967 Caistor St. Edmunds and at 5 other sites, 1970 Dunston, Tow Path, Norwich, 1972 Pound Lane, Thorpe, 1973 present Poringland Village Pond. E. A. Ellis.*
21. *1947 Hainford, 1961 Catton Grove. 1967 recorded at 3 sites. J.J.S. Survey.*
22. *1741-1925 Sratton Strawless, 1967 at 15 sites, 1971 205 specimens dead on road between Coltishall and Swanton Abbott. E. A. Ellis.*
23. *1960 North Walsham, 1967 recorded at 14 sites, 1968 30th April numerous tadpoles Knapton Hall Lake. J. G. Goldsmith.*
24. *1967 at one site, 1967 April, spawn, Cromer. J. Buckley.*
30. *1967 at 7 sites, 1970 spawn, Wheatfen. J. G. Goldsmith.*
31. *1970 Hoveton, 1971 Ludham, 1972 Salhouse, 1973 South Walsham, 1973 breeding at Upton Broad. G. Coupland.*
32. *1961 Ingham, 1964 Lessingham, 1967 at 9 sites, 1970 Bacton Wood, 1971 Mill Farm, Happisburgh. M. W. Ferguson.*
40. *1972 recorded in this square. R. J. Driscoll & A. J. Lees.*
41. *1961 Potter Heigham, 1966 Hickling, 1967 Hemsby, 1968 Ormesby, 1972 Fishley, 1973 Acle, 1973 recorded breeding at Stokesby. G. Coupland.*
42. *1967 at 6 sites, 1970 Horsey, 1972 May 15th breeding Winterton N.N.R. L. Bensley.*
50. *1936 Southtown, Gt. Yarmouth. E. A. Ellis.*
51. *1951/52, 1961 Caister, 1974 North Denes, Yarmouth. E. A. Ellis.*

TL 88. *1897 Thetford, 1961 Lynford, 1966 Langmere, 1967 at 4 sites. J.J.S. Survey.*
98. *1960's recorded in this square. A. L. Bull.*
99. *1937 Caston, 1973 August 4th, Stow Bedon Common. 1974 July, Thompson Common. J. Buckley.*

TM 08. *1937 Kenninghall, 1961 Banham, 1966 S. Lopham, 1967 at 4 sites, 1971 one adult S. Lopham. J. G. Goldsmith.*
09. *1967 recorded at 6 sites, 1973 Morley St. Botolph. C. Cuthbert.*
18. *1967 at 8 sites. J.J.S. Survey.*
19. *1910 Flordon Common, 1961 Great Moulton, 1967 at 12 sites, 1968 Forncett St Peter, 1972 June, Flordon Common. R. E. Baker.*
28. *1967 at 18 sites. J.J.S. Survey.*
29. *1967 at 8 sites. J.J.S. Survey.*
39. *1961 Hedenham, 1968 spawn in dyke at Chedgrave Common. J. G. Goldsmith.*

The Edible Frog (*Rana esculenta*)

The edible frog has been recorded from at least six sites in Norfolk, and a colony still exists at one of these sites. At the end of the last century there was some discussion as to whether these colonies might in fact be residual populations of native animals, but there has never been much doubt that their presence has resulted from the introduction of animals earlier in the 19th century.

Gadow, in 1904, claims to have heard edible frogs calling during the breeding season of 1883, at Hickling Broad, but no more details of this sighting are available.

The main records for this species result from the activity of Professor Alfred Newton. When travelling from Thetford to Scoulton, with his brother, he discovered a colony of edible frogs in the parish of Rockland All Saints. Edible frogs are difficult to catch and he was hard pressed to secure four individuals,

with the aid of his umbrella ! Three of the specimens died and were sent to the Norfolk & Norwich Museum, but unfortunately they are no longer in the collection. Following the discovery of this colony on the 8th June 1853, Prof. Newton lost no time in sending Mr. J. H. Gurney the news. Mr. Gurney knew that Mr. George Berney of Morton Hall, Norwich, had imported large numbers of edible frogs, and in 1859 Mr. Berney sent Prof. Newton details of his introductions. Apparently Mr. Berney had visited Paris in 1837 and brought home some two hundred frogs and a great quantity of spawn. These were deposited in the ditches of the meadows at Morton, in some ponds at Hockering and some were placed in the fens at Foulden, near Stoke Ferry. The frogs did not like the Morton Meadows and some travelled $1\frac{3}{4}$ miles to ponds at the top of Honingham Heights.

In 1841 he imported another batch from Brussels, and in 1842, 1,300 were brought over from St. Omer and dispersed at the above sites, and many hundreds were put into the fens at Foulden and in the neighbourhood. The colony at Rockland All Saints was undoubtedly descended from Mr. Berney's importations. In 1869 Mr. Southwell visited the site of this colony but could not see or hear any frogs. Nothing more was heard of edible frogs in this area until 30th May 1875, when Prof. Newton, in the company of Lord Walsingham, discovered a colony near Stow Bedon Station on the Thetford & Watton Railway. One specimen was taken at this site and deposited at the Norwich Museum. Lord Walsingham made enquiries about the status of this species in the neighbourhood and found it to be "pretty generally diffused". Richard Lubbock visited the area and was unsuccessful in his search, but later he did receive several specimens from the area and considered them to be "generally dispersed over an extent of several miles." Both Newton and Lubbock considered them to be well established in the area. In 1898 Boulenger recorded them as still abundant between Thetford and Scoulton, but in 1951 Malcolm Smith considered that edible frogs no longer existed in Norfolk. However, unknown to most people, a colony presumably persisted in this locality. About 1960 Paul Banham received reports of Edible Frogs in this region but he dismissed them amongst a host of spurious claims. In 1966 the frogs were rediscovered at 3 ponds in this area during a Norfolk and Norwich Naturalists Society botanical excursion. Specimens were photographed by George Garrod and, in the same year, two juveniles were brought to a society meeting and later returned to the colony.

The Provisional Distribution Atlas for Reptiles and Amphibians shows that there are only eighteen 10km squares in England with post 1960 edible frog records. Only three records are north of a line from the Bristol Channel to the Stow, and of these the Norfolk site in TL 99 is the most northerly.

The colony was visited in 1974 and two systematic counts were made, on 30th July 38 individuals were seen and on 7th August 42 frogs. Edible frog tadpoles were caught and released on both dates. Investigation of other suitable habitat in this 10km square has resulted in the finding of two smaller sites with edible frogs.

Rana esculenta

TG 10 and 11. *1837, 1841, 1842. In these years, Mr. George Berney of Morton Hall. made a series of introductions in the ditches at Morton* (TG11) *and in some ponds at Hockering* (TG10). *It is interesting that Mr. Berney records a movement by some frogs of* $1\frac{3}{4}$ *miles from the ditches at Morton to ponds at the top of Honingham Heights* (TG11). *There is an unconfirmed record of Edible Frogs being*

at Hockering in the early 1960's but I consider it unlikely that they still exist at this locality. Many ponds which were formerly suitable have been spoiled by the growth of vegetation around their margins, and the general lowering of the water table for agricultural purposes.

42. *1883 Gadow (1904) claims to have heard edible frogs during the breeding season at Hickling Broad. No further details are given and this record must be regarded as doubtful.*

TL 88. *Ellis (1957) writing in the Eastern Daily Press records that Mr. Buxton had a small colony of edible frogs in his garden pond at Thetford and that it is not known whether these frogs established themselves in the wild.*

79. *1837, 1841, 1842. During these years introductions of edible frogs "into the fens at Foulden, near Stoke Ferry" were made by Mr. Berney. "Many hundreds" were released but there are no recent records of edible frogs in this locality.*

99. *1853, 1875, 1960's, 1966, 1974. There is little question that the presence of edible frogs in 10km square is due to the original introductions by Mr. Berney in 1830's-40's and that doubts of their continued existence, Smith (1951) and Leutscher (1975) are unfounded. Richard Lubbuck 1879 considered the edible frogs to be "pretty generally dispersed over an extent of several miles." Since then the suitable habitat has become fragmented and two isolated colonies are known in addition to the main colony. A confidential report on* R. esculenta *in Norfolk has been deposited with the Nature Conservancy Council and the Castle Museum at Norwich.*

Marsh Frog Rana ridibunda

TG 20. *1960. At about this time some 20 specimens, collected from Romsey Marsh, were released on the marshes at Mile Cross, Norwich, by Mr. Terry Easter. Details of this introduction need clarification but there is some evidence that they bred on the marshes during the early 60's. A search in 1974 failed to reveal any specimens.*

The Slow-Worm (*Anguis fragilis*)

In 1871 T. Southwell recorded this species as not uncommon on heath sand in dry woods and other recorders in the late 19th century agree with him. Banham (1961) observed that records collected during his survey were from an area running NW/SE through Norwich. Patterson (1905) only found it very locally and Ellis (1965) records few specimen in broadland except in village churchyards.

The 1973 Atlas Map show that the slow worm is a widely distributed species in England, Scotland and Wales. Prestt et al (1974) consider that it is not an endangered species, but that in some parts of the country local decreases have occurred.

Anguis fragilis

TF 71. *1974 Pregnant female seen East Wineh Common. J. Buckley*

91. *1961 East Bilney, 1963 August, one small specimen, Gressenhall Green. Miss D. M. Maxey.*

TG 00. *1960 Runhall, P.R.B. Survey.*

03. *1952 Holt Lowes, 1959 & 1961 Holt, 1970 one dead on lane between Briston and Corpusty. A. R. M. Palmer.*

04. *1961 Salthouse, 1971 May, one found dead Walsey Hills, Cley. J. Reynolds.*

11. *1961 Attlebridge, 1965 Felthorpe, 1972 Costessey, 1974 Old Costessey abundant. E. A. Ellis.*

12. *1957 Aylsham, 1961 & 66 Buxton Heath, 1968 August 21st Buxton Heath, 1974 April, Buxton Heath. Society record.*

13. *1972 recorded in this square by M. J. Bishop.*
14. *1973 August 25th, one specimen Beeston Common. F. Farrow.*
20. *1956-59 & 70 Caistor St. Edmunds, 1961 Stoke Holy Cross, 1964 Upper Stoke, Norwich Cemetery, 1970 Bramerton, 1973 ten specimens, Swainsthorpe, 1974 Bowthorpe Cemetery. F. H. Ashton.*
21. *1961 Mousehold Heath, 1961 Sprowston. J. T. Turner.*
23. *1961 North Walsham. N.N.N.S Record.*
24. *1963 one specimen, Cromer. D. Thurling.*
30. *1974 Rockland St. Mary. E. A. Ellis.*
32. *1972 26th August. One dead on road East Ruston. R. Gribble.*
50. *1959 Gorleston. N.C.M. record.*

TL 88. *1911 Thetford. G. T. Rope.*

TM 09. *1960 Morley. P.R.B. Survey.*
18. *1870-71 Burston. Rev. H. T. Frere.*
19. *1964 var* colchicha *recorded. H. R. Arnold.*
28. *1967 Alburgh. N.C.M. record.*
39. *1961 Loddon, 1973 Hedenham. R. J. Hornby.*
49. *1971 Fritton, 1974 Haddiscoe. E. A. Ellis.*

Sand Lizard (*Lacerta agilis*)

East Ruston Common (TG. 32) is the only site where this species has been said to exist. This record was made by Mr. Bird and is recorded in E. J. Rope's "Reptiles of Suffolk" 1934. I am grateful to Mr. Arnold for sending me details of this record. Both Dr. E. A. Ellis and I consider that this record is probably erroneous.

Common Lizard (*Lacerta vivipara*)

This species was described by T. Southwell (1871) as frequent on heaths, hedge-banks and dry places. Banham (1961) suggested that there was some decrease on the coastal dunes but elsewhere it was as common as ever. Ellis (1965) writing of Broadland, records it as fairly common and widespread on heaths, sandhills and present on many of the river and marsh walls. Undoubtedly the number of suitable sites had decreased since 1871, but where these habitats exist this species can still be described as common.

Lacerta vivipara

TF 61. *1974, 26th July. Several seen East Winch Common. J. Buckley.*
62. *1962 Gaywood. 1966 King's Lynn. 1968, 7th July, Wolverton Bog. K. C. Durrant.*
63. *1960 Snettisham, 1966 Dersingham, 1968 Heacham & Snettisham. A. N. Cobb.*
71. *1967 August, West Acre. P. R. Cobb.*
72. *1974 22nd August. Adult female about 2 years old, Grimston Heath. J. Buckley, J. Ismay.*
73. *1974 recorded in this square. J. Buckley.*
74. *1967 Brancaster, 1971 Holme, 1971 28th August, two specimens Brancaster. S. Tansey.*
81. *1974 25th August, Litcham Common. J. Buckley.*
84. *1965 Holkham, 1966 Burnham Deepdale, 1968 10th October, specimens seen Holkham. Dr. D. W. Wells.*
90. *1960-67 Cranworth. A. L. Bull.*
91. *1961 July, Beetley. Miss D. M. Maxey.*
92. *1962 23rd April, Brisley. Miss D. M. Maxey.*
93. *1961 Binham. Mr. Scott.*

94. *1973 Wells Dunes. P. R. Banham.*

TG 00. *1957 Runhall, 1958 South Farm, Mattishall. P.R.B. Survey.*

01. *1961 Two-tailed specimen seen at Mattishall. P.R.B. Survey.*

03. *1952 Holt Lowes, 1961 Holt. P.R.B. Survey.*

04. *1968 25th August, one juvenile, Kelling Heath. J. Buckley.*

10. *1966 Bowthorpe and Bawburgh. 1972 June, Colney Hall Marshes. R. E. Baker.*

11. *1960 Attlebridge, 1961 & 1964 Felthorpe, 1966 Horsford, 1966 August 6th, 1 specimen Taverham Pits. J. Buckley and J. G. Goldsmith.*

12. *1936 Buxton Heath, 1961 Aylsham, 1969 many specimens seen Buxton Heath, Hevingham. J. Buckley.*

13. *1971 Aldborough. Mrs. Brewster.*

14. *1968 24th 3 adults and 1 juvenile, Beeston Common. J. Buckley.*

20. *1964 and 1970 Eaton, 1967 Norwich Cemetery, 1973 Swainsthorpe, 1974 June, 20 specimens, Eaton. E. T. Daniels.*

21. *1961 Sprowston, 1962 Stratton Strawless, 1965 Mousehold Heath, 1973 July 1 specimen Hellesdon. F. H. Ashton.*

22. *1973 15th September, one specimen, Gt. Hautbois. R. N. Pigot.*

23. *1957 North Walsham. N.N.N.S. record.*

24. *1903 Cromer. G. R. Leighton.*

30. *1933 28th March. One specimen, Buckenham. E. A. Ellis.*

31. *1970 How Hill, Ludham. 1970 August 8th, one adult female, Irstead. J. Buckley*

32. *1974 East Ruston, 1974 Crostwight Heath. J. G. Goldsmith.*

33. *1965 Walcott, 1971 Happisburgh. M. W. Ferguson.*

40. *1972 24th April. One specimen, Reedham. E. A. Ellis.*

41. *1961 Martham, Ormesby St. Michael, 1972 two males and one female, Fleggburgh. R. J. Driscoll.*

42. *1961 Dunes from Hemsby to Horsey 1964, 1972 and 1973 Hickling, 1966. Calthorpe Broad, 1967 Sea Palling, 1970 &72 Winterton Dunes, 1973 Winterton Dunes. G. Coupland.*

50. *1957 Gorleston, 1967 16th April, one specimen, Breydon Water. Norfolk Young Naturalists.*

51. *1951 & 52 Caister-by-sea. 1962 July, several Hemsby Great Valley Dunes. J. Buckley.*

TL 69. *1960 Hargham Heath. P.R.B. Survey.*

88. *1847 Thetford, 1917 Thetford. G. A. Boulenger.*

89. *1961 Lynford. P.R.B. Survey.*

98. *1967 6th July, Bridgham Heath, 1974 May, E. Wretham. E. A. Ellis.*

99. *1974 Juvenile seen Thompson Common. J. G. Goldsmith.*

TM 08. *1934 Garboldisham. E. J. Rope.*

09. *1960 Morley. P.R.B. Survey.*

19. *1910 Flordon Common, 1973 Tharston. R. J. Hornby.*

28. *1934 Needham. E. J. Rope.*

39. *Hedingham. Miss Riches.*

49. *1961 Fritton, Suffolk. R. Foster.*

Grass Snake (*Natrix natrix*)

In 1871 T. Southwell considered this species not to be as common as formerly, but still abundant in places. Miller & Skertchly (1878) quote is as very common in all parts of the fens. Patterson (1905) found the grass snake common at Belton, Fritton and Acle. Banham (1961) suggested that this species is most common in Broadland. Ellis (1965) however, considered it distinctly rare in the greater part of the Broads, but that in the vicinity of the Yare and Waveney they were becoming more abundant and widespread.

In Britain the grass snake has a more restricted range of habitats than the adder, it remains in close proximity to water and at lower altitudes. In Britain it is confined to part of the country south of latitude 54°, 40' N. Prestt et al. (1974) considers it to be widely distributed and locally common, but there are suggestions of declines in some places.

Natrix natrix

TF 62. *1965 one specimen, Gaywood. S. Baxter.*
70. *1972 August. Several specimens Foulden Common. P. Hart.*
71. *1968 12th August. One specimen Narborough Gravel Pits. P. R. Cobb.*
90. *1961 Watton. N.N.N.S record.*
TG 02. *1961 October. One specimen, Bawdeswell Heath. T. J. Turner.*
03. *1952 2 records for the Holt area. R. M. Holmes.*
04. *1973 26th May, Walsey Hills, Cley, the first recorded locally. R. A. Richardson.*
11. *1965 two specimens, Drayton. R. Carter.*
14. *1965, five specimens, Bodham Common. R. Carter.*
20. *1933 Carrow, Norwich, 1961 Caistor and Lakenham, 1962 Kirby Bedon, 1969 Trowse and Thorpe, 1970 Whitlingham Sewage Farm, 1972 one specimen Poringland. J. G. Goldsmith.*
21. *1961 Sprowston Churchyard. T. J. Turner.*
30. *1960 Brundall, 1961 Blofield, 1971 Cantley and Surlingham, 1972 Wheatfen, 1974 several specimens Wheatfen. E. A. Ellis.*
31. *1963 Ludham, 1973 Upton & South Walsham.*
32. *1974 Dilham. E. A. Ellis. 1974 several specimens seen Upton. J. Buckley.*
33. *1974 May, 1 specimen, Mundesley. Miss C. Penniall.*
40. *1962 Reedham, 1963 Freethorpe, 1966 21st May, one specimen Halvergate Marshes. J. Buckley & J. G. Goldsmith.*
41. *1963 Acle, 1964 Runham, 1968 Ormesby Broad, 1968, 1972 sloughed skin found Burgh Common. R. J. Driscoll.*
50. *1972 Yarmouth, 1973 one specimen Southtown and five specimens Cobholm, Yarmouth. R. J. Driscoll.*
51. *1961 Caister by sea, 1967 22nd August, one specimen Caister by sea. Norfolk Young Naturalists.*
TL 69. *1971 July 3rd, one specimen Hilgay. A. E. Vine.*
88. *1897 Thetford, 1961 Santon Downham &Lynford, 1970& 1973 Santon Downham 1974 16th June, Grimes Graves. Society Outing.*
89. *1961 Mundford& Cranwich, 1967 October 10th, one specimen Mundford. N.C.M. record.*
98. *1897 Roudham Heath, 1973& 74 sloughed skins found Ringmere. Mrs. Marriot, confirmed J. Buckley.*
99. *1973 August, Thompson Common, seen by local farmer. J. Buckley.*
TM 18. *1960 Diss, 1974 7th April, one specimen Dickleburgh. E. T. Daniels.*
28. *1967 October 3rd, one specimen Alburgh. N.C.M. record.*
29. *1900 one specimen Woodton. P.R.B. Survey.*
39. *1960 Geldeston, 1961 Hales & Heckingham. P.R.B. Survey.*
49. *1971 September, one specimen Herringfleet, Suffolk. R. Foster.*

Italian Grass Snake. Natrix natrix

TM 29. *1964 29th July a 38in. specimen was killed on the road at Kirstead and identified by Dr. E. A. Ellis. Undoubtedly this specimen had escaped from captivity having probably been bought from a pet shop.*

Adder (*Vipera berus*)

T. Southwell (1871) records this species as frequent on heaths and waste places. Patterson (1905) records it from the North Denes, Belton and Fritton. In 1961

most of the records come from heaths of the Cromer Ridge and the area N.W. of Norwich. Ellis (1965) says that, "it was formerly very common roundabout the broads of the Thurne and Ant, where it is still found there, in much smaller numbers. Today its main stronghold lies in the coast dunes and the adjacent heaths and sub-maritime fens." With rough land becoming less frequent this species is mainly confined to dunes and heathland.

In Great Britain the adder is widely distributed and found in a variety of habitats which include cliffs, coastal marshes, mountain and moorlands in upland areas and chalk downland, lowland heath, open woodland and boggy valleys elsewhere inland. In England and Wales the adder is widespread and locally common, and it is widespread in Scotland. There is, however a paucity of records from a wide diagonal belt of country extending from Mid-Lancashire in the N.W. through South Lancashire, across the plane of the Midlands to Cambridgeshire in the S.E. This stretch of country contains some of the least suitable habitats for adders in the country, Prestt et. al. (1974).

Vipera berus

TF 62. *1961, 1970 Roydon, 1973 16th September, one small specimen Roydon Common. J. R. Hornby.*
71. *1974 26th July, one adult East Winch Common. J. Buckley.*
72. *1959 Roydon, 1961 Leziate Fen. Dr. Shepheard.*
80. *1961 Necton. N.N.N.S. Newsletter.*
83. *1968 August, Syderstone Common. E. M. Dams.*
90. *1960 Watton. N.C.M. record.*

TG 03. *1952, 1964 Holt Lowes, 1960 Holt, 1961 Edgefield, 1972 one adult specimen Holt Lowes. R. J. Hornby.*
04. *1961 Salthouse Heath, 1967 Kelling Heath, 1971 1st May specimen Walsey Hills, Cley, 1974 Salthouse. E. A. Ellis.*
11. *1959 Felthorpe, 1961 Attlebridge. M. E. Smith.*
12. *1968 Buxton Heath, 1971 Buxton Heath, 1974 Buxton Heath. E. A. Ellis.*
14. *1964 Sheringham, 1971 Kelling & West Runton, 1973 Beeston Common, 1973 August 17th, one specimen Weybourne Station. G. McColl.*
20. *1960 Dunston Common. P.R.B. Survey.*
21. *1961 Sprowston Churchyard, 1974 Horstead. Society record.*
22. *1960 Hevingham, 1961 Stratton Strawless, 1961 Felmingham Heath. Dr. Shepheard.*
23. *1961 Felbrigg & North Walsham Woods. Dr. Shepheard.*
24. *1960 Cromer. N.C.M. records.*
31. *1973 19th May, one juvenile South Walsham. J. Mayhew.*
32. *1897 Stalham, 1960 Ingham, 1974 Dyball's Common, East Ruston, E. A. Ellis.*
33. *1961 Happisburgh. N.N.N.S record.*
40. *1974 Common Belton-Fritton area. E. A. Ellis.*
42. *1961 Winterton, 1967 Sea Palling, 1968 Calthorpe Broad, 1973 Stubb & Horsey, 1973 Winterton Dunes. G. Coupland.*
50. *1934 Gorleston, 1961 Yarmouth Dunes, 1973 specimens St. Hughes Green and Magdalene Estate, Gorleston. R. J. Driscoll.*

TL 68. *1878 Hockwold Fen. S. H. Miller.*
69. *1878 Methwold Fen. S. H. Miller.*
88. *1897 Thetford, 1961 Thetford, 1967 recorded in this square. P. R. Cobb.*
98. *1961 and 1974 East Wretham Heath. Mrs. Marriott.*
99. *1973 August, four specimens shot Thompson Common, J. Buckley.*

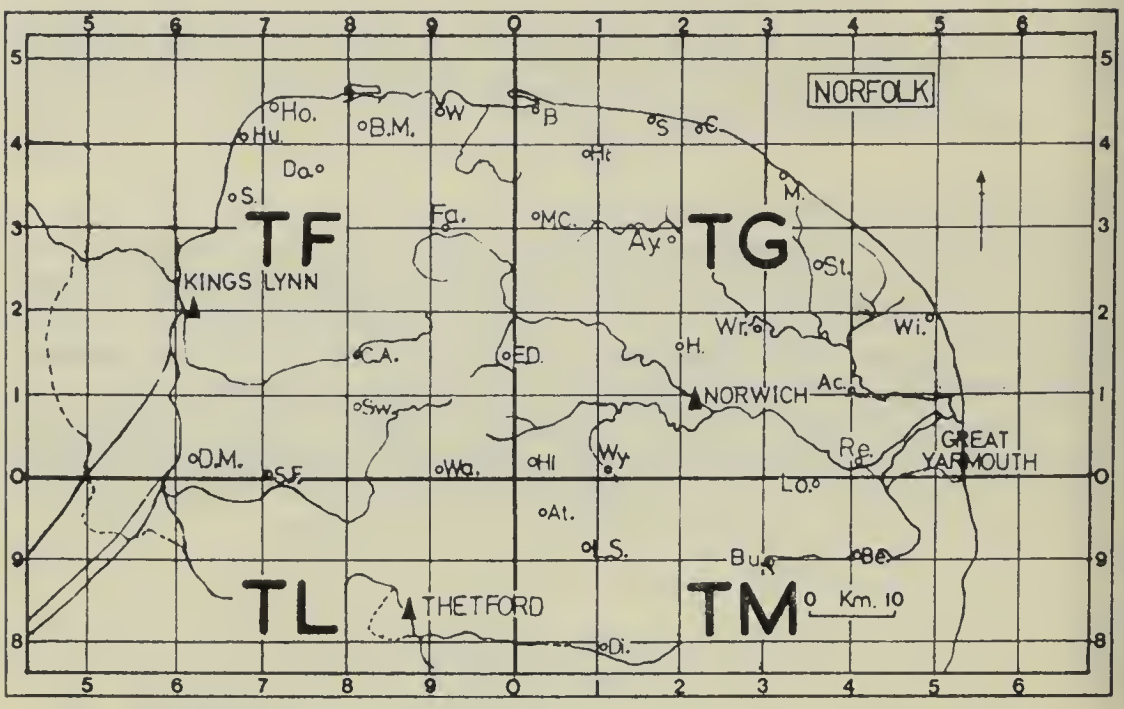
TM 07. *1966 12th May, South Lopham Middle Fen. M. J. D. Brendell.*
08. *1960 South Lopham. Suffolk Nat. Soc. Record.*
18. *1960 Diss. Mr. Jessop.*

Leathery Turtle (Dermochelys coriacea)

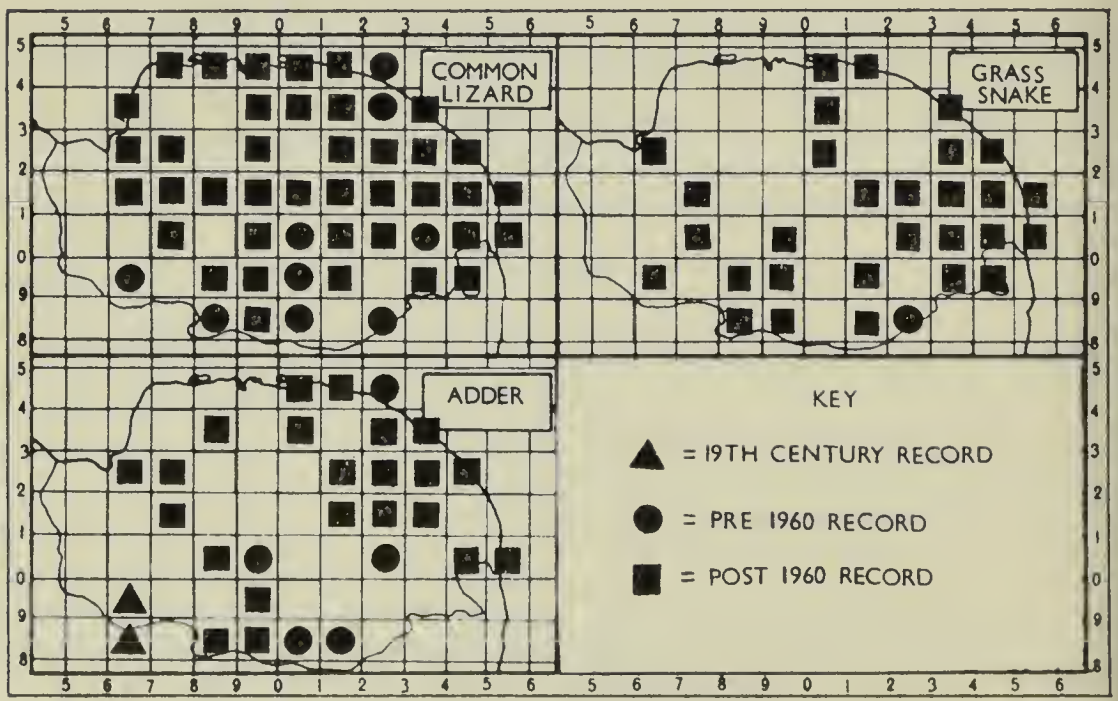
TG 50. *1956 Ellis (1956) records that a specimen of this species of turtle was washed up on the 11th February, 1956 at Caister on Sea. The only previous East Anglian record was in November, 1913 when two specimens fouled herring nets off Lowestoft. One animal escaped but the other broke its neck and died aboard the ship two hours after being captured.*

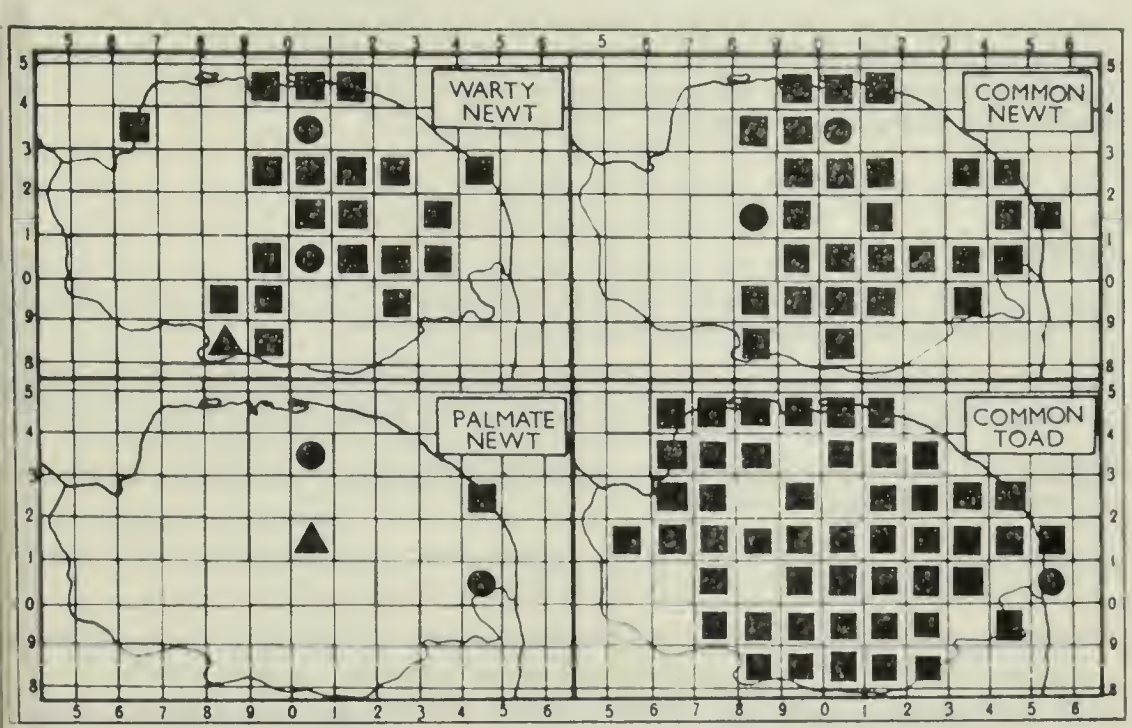
European Pond Tortoise (*Emys orbicularis*)

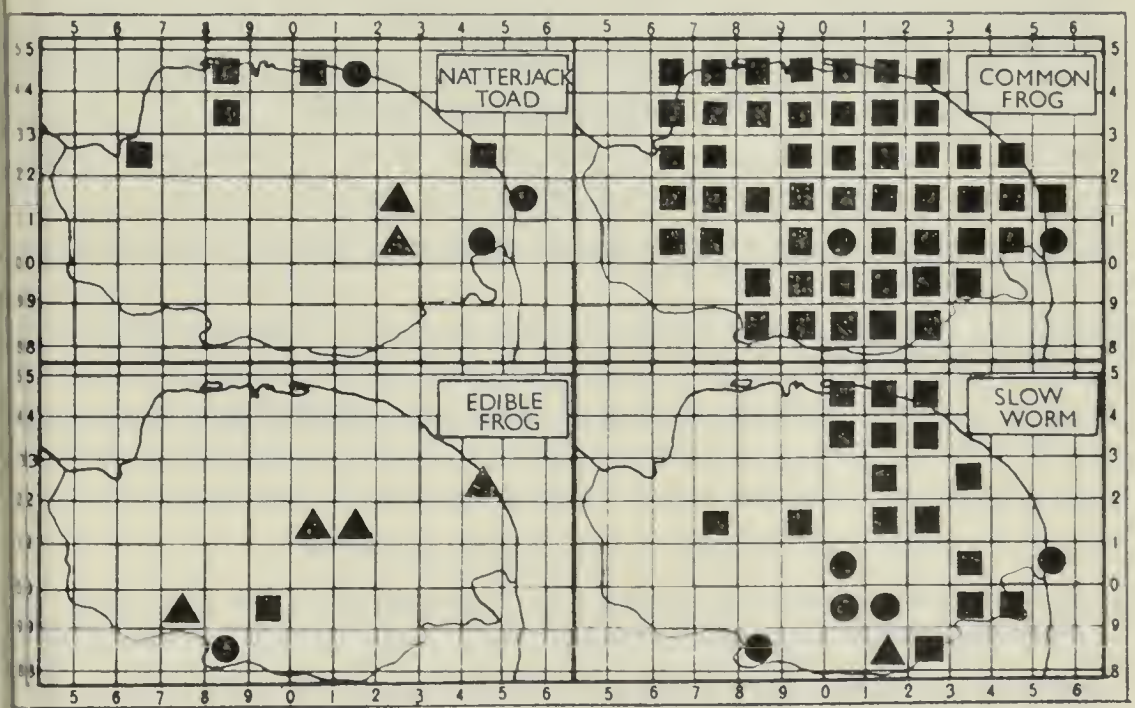
This species of terrapin is frequently sold in local pet shops and specimens are now living wild in parts of Broadland, having escaped from captivity. Ellis 1968, 1974 records specimens from Barton, TG 32; Brundall, TG 30; Hoveton, TG 31; Rockland, TG 30; Strumpshaw, TG 30; Mr. Ray Gribble also recorded a specimen at East Ruston, TG 32, in 1974. Ellis (1968) only records one successful breeding, East Suffolk 1929, for whilst the climate in Norfolk is suitable for adult pond tortoises the summer is not long or warm enough for the incubation of the eggs. Unless there is a marked climatic chance it is unlikely that this species will be able to establish itself in the wild in Norfolk.



A MAP TO SHOW THE LOCATION OF 100KM AND 10KM SQUARES IN NORFOLK




WARTY NEWT
COMMON NEWT
PALMATE NEWT
COMMON TOAD


NATTERJACK TOAD
COMMON FROG
EDIBLE FROG
SLOW WORM

Acknowledgements

I am most grateful to the members of the Society for sending in herpetofauna records and especially to Dr. R. E. Baker and Dr. E. A. Ellis for collecting records together. I would also like to thank Mr. Alan Parton for drawing the maps and Mrs. C. B. Buckley for typing the manuscript.

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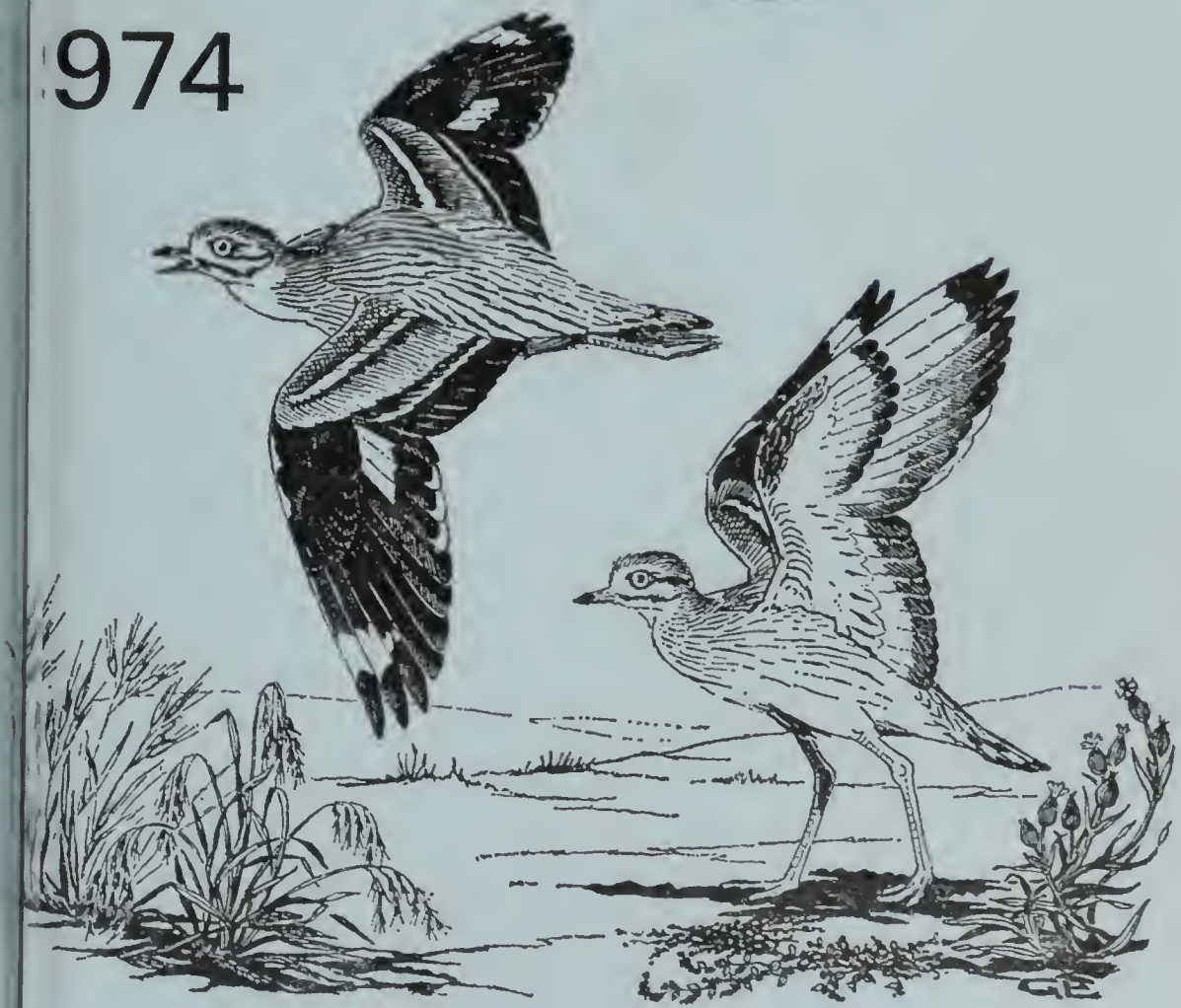

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Vol. 23 Part 4

NORFOLK ORNITHOLOGISTS ASSOCIATION

(Registered Charity)

The Norfolk Ornithologists Association was formed in 1970 with the primary objective of providing support to Holme Bird Observatory (Est. 1962).

Since then two other small reserves along the Norfolk Coast have been acquired by the Association. Walsey Hills (purchased) Salthouse, and Dodman's Farm Reserve (Agreement) Titchwell. Holme Bird Observatory is wardened full-time and open daily to visitors either by membership or permits obtainable on the day at the Observatory's ringing laboratory. Titchwell is wardened on a seasonal basis while it is expected that Walsey Hills will be wardened in the near future.

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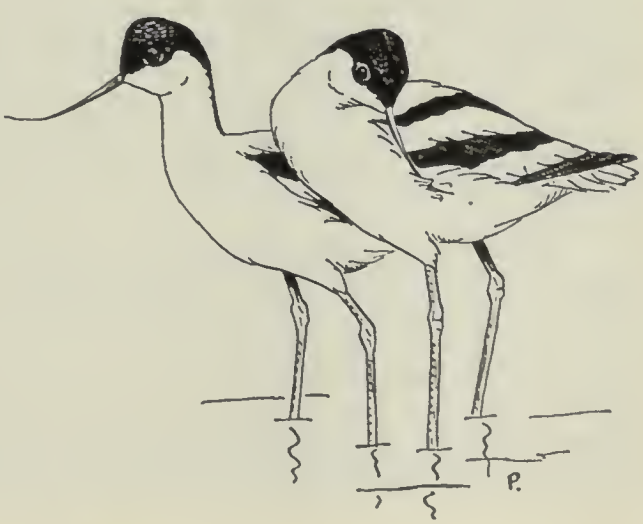

Editorial

Weather . . . Review of The Year . . . Road Casualties . . . Migration Highlights . . . Holme Observatory . . . Sea-watching at Sheringham . . . Oil Pollution . . . Acknowledgements . . . Recording

The Council of the Norfolk Naturalists Trust, in co-operation with the Norfo and Norwich Naturalists' Society, is pleased to present the annual report on th birds of Norfolk.

The Weather: Irregular distribution of rainfall was the most obvious feature 1974: spring was the driest on record while autumn proved to be one of the wette for many years. Jan. was the warmest since 1957. After a cold start a series depressions brought mild showery conditions; gales and strong winds were exper enced on many occasions. Feb. was the mildest since 1950 and the wettest for fiv years. Numerous depressions crossed the country during the first half of the mont March was drier than normal while April shared the distinction with that of 1957 being the driest since local records began in 1925. May, together with April, and th second half of March constituted the driest spring in local records.

Both June and July were cool and unsettled conditions occurred during th first half of Aug. Numerous depressions crossed the country at the beginning an the end of Sept. Oct. was the coldest since local records began and the wettest sinc 1961. A series of weather fronts brought cloudy conditions and long periods of rai

Nov. was the wettest since the notorious Nov. of 1971 and heavy rain wa recorded on many days. Dec. was the warmest since 1953 although unsettled cond tions occurred for much of the month.

Review of the Year: October was one of the most notable months in 1974 an will be remembered for three features: a large scale autumn invasion of Roug legged Buzzards from Northern Europe, an impressive movement of Little Auk and an irruption of Waxwings. Among the year's vagrants from Southern Euro were Cattle Egret, 2 Alpine Swifts, Subalpine Warbler (the fourth county recor and Bonelli's Warbler (the third county record).

Eastern European wanderers included 2 Red-footed Falcons, Black-winge Pratincole (the second county record and August showpiece at Cley), White-winge Black Tern, 4 Gull-billed Terns, 8 Barred Warblers, Greenish Warbler, 5 Red breasted Flycatchers and Scarlet Rosefinch. From Arctic Asia (or North America came a Lesser Golden Plover and 2 Pectoral Sandpipers (including a spring-tim record). A surprise from the tundra was a total of 10 Sabine's Gulls (the same num ber as in 1973).

From Asia beyond the Urals came 2 Pallas's Warblers; surprisingly no Yellow browed was reported; also 7 Richard's Pipits. There was one addition to th county list: Lesser Golden Plover.

Notable breeding birds included over 60 pairs of Fulmars, 9 pairs of Littl Ringed Plovers, 3 pairs of Black-tailed Godwits, Herring Gull, 2 pairs of Commo Gulls, 2985 pairs of Sandwich Terns, Short-eared Owl, 11 pairs of Woodlarks i the Breck, 3 pairs of Black Redstarts and 7 pairs of Red-backed Shrikes.

Black-winged Pratincole at Cley/Salthouse during late August was the second county occurrence.

Road Casualties: Along a five-mile stretch of the A47 between Yarmouth and "Stracey Arms" totalled 82 birds as follows: 14 Black-headed Gulls, 39 Moorhens, 5 Skylarks, 7 Blackbirds, 2 Hedge Sparrows, 9 House Sparrows, 3 Lapwings, 2 Goldfares and single Rook and Mute Swan.

Migration Highlights at Holme Observatory: Spring passage was disappointing at Holme with bitter easterly winds continuously for 40 days. Among the highlights were Wryneck, Rough-legged Buzzards, Marsh Harriers, Osprey, Crossbill and Red-footed Falcon.

Notable autumn visitors included Kentish Plover, Marsh and Montagu's Harriers, Wrynecks, Manx Shearwaters, Hobby, Great Grey Shrikes, Pomarine Skuas, Sabine's Gull, Waxwings, Black Redstarts, Firecrests, Lapland Buntings, Rough-legged Buzzards, Long-eared Owls and Shorelarks. Two new sight records were Cetti's Warbler and Golden Plover, bringing the total seen in the area since 1962 to 253.

The largest-ever irruption of Bearded Tits resulted in 55 being ringed and three birds caught had been ringed in Suffolk three months previously. Full details of the year's events appear in the Observatory's 13th *Annual Report*.

Sea-watching at Sheringham: At the end of Oct. a depression from the south of Greenland passed close to Iceland before turning south-east into the North Sea. Gale-force winds on 28th veered to the north-west bringing a large-scale sea bird movement in view of shore observers. The following summary from Sheringham is provided by JM and KBS:

Oct. 28th (9 hour watch in NW gale) 53 Mallard, 63 Wigeon, 3 Pintail, 13 Teal, Tufted, 19 Pochard, 33 Goldeneye, 3 Scaup, 100 Common Scoter, 9 Red-breasted Mergansers, 6 Eiders and 3 Great Skuas moved west, a total of 6 Short-eared Owls arrived from the NE and crossed the coast and 22 Pomarine and 2 Arctic Skuas, Little Gulls and 200 Kittiwakes headed east. A Sabine's Gull came in from the west passing other gulls at the sewer outfall, but without stopping. A Grey Phalarope briefly settled on the sea before continuing west and at 1540 hours a party of 6 Little Auks passed westwards.

Oct. 29th (7 hour watch in N. gale) 2 Great crested Grebes, Fulmar, 769 Brent Geese and 784 Shelduck, 9 Mallard, 141 Wigeon, 48 Teal, 5 Pintail, Pochard,

5 Tufted, 92 Common Scoter, 7 Goldeneye, 34 Red-breasted Mergansers and small parties of Bar-tailed Godwits, Grey Plover, Knot, Dunlin and Turnstone all moved west. 130 Little Auks, mostly in parties of up to half a dozen and in association with parties of small waders also passed west. Moving east were 30 Gannets, 9 Great and 3 Pomarine Skuas, 14 Little Gulls and 800-1,000 Kittiwakes. An immature Glaucous Gull spent most of the afternoon at the sewer outfall.

Oct. 30th (7 hour watch in N. gale moderating and backing NW). 150 Brent Geese, 117 Shelduck, 37 Mallard, 38 Wigeon, 14 Teal, 2 Pintail, 2 Tufted, 16 Pochard, 3 Goldeneye, 47 Common Scoters, 11 Red-breasted Mergansers and 6 Great Northern Divers all moved west. 102 Little Auks passed west in small parties of up to 8. Only a few waders in view. A Storm Petrel slowly headed east just beyond the breakers in mid-morning and 3 single Short-eared Owls headed inland.

Oct. 31st (calm) the last 2 Little Auks flew west in the morning.

Oil Pollution: Following days of easterly winds oil was driven ashore along the Norfolk coast between April 12th and 17th. One type of oil was so weathered and solid that a bucket lowered from a helicopter to collect a sample would not penetrate the oil. Many birds fell victim and the following casualties were recorded between Snettisham and Lowestoft: 187 Guillemots, 16 Razorbills, 6 Puffins, 1 unidentified auk, 1 Red-throated Diver, 3 Cormorants, 1 Storm Petrel, 10 Gannets, 9 Fulmars, 4 Common Gulls, 14 Black-headed Gulls, 1 Herring Gull, 3 Kittiwakes, 40 unidentified Gulls, 1 Brent Goose, 1 Mallard, 1 Coot, 1 Oystercatcher, 1 Sanderling, 1 Chaffinch, and 17 unidentified (total 319).

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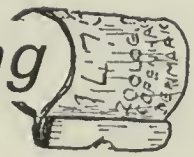
Recording: Records for the 1975 Report should be sent by the end of February to Michael J. Seago, 33 Acacia Road, Thorpe St. Andrew, Norwich NR7 0PP. Contributors are requested to submit notes in the order followed in B.T.O. Guide 13 (*A species List of British and Irish Birds*). In order to minimise the work involved, records will not normally be acknowledged. The names of all contributors will be included in the Report. Following boundary adjustments on 1st April 1974, this Report includes records from localities formerly appearing in the *Suffolk Bird Report*.

New members may be assured that their observations are appreciated and are recorded on an annual card index. However, as the normal pattern of events has been well established after a lengthy series of Reports, there is more opportunity for summary and not so much need to document less unusual occurrences. Observer's initials are normally reserved for the really unusual contributions.

Bird Ringing Report



Summaries of recoveries have been used wherever this method gives the clearer
ture, providing space for the large number of other interesting reports. Waders
ntinue to provide recoveries from far and wide: Northern Canada and Greece,
eria and Guinea, and the bulk of these have been extracted from the Bulletins
the *Wader Study Group*. There are details of a Swallow caught up in the severe
ather in Central Europe during October, and a Brambling wintering in Italy.

There is also great significance in humbler journeys, and species often regarded
sedentary are given space—Barn Owl, Long-tailed Tit, Wren and Reed Bunting.

The term 'pullus' is used for unfledged young, normally ringed in the nest, and
ntrol' indicates the handling of a live ringed bird at a distance from the place
ere first ringed.

lmar

South Ronaldsay, Orkney
(pullus) 21.8.66 — Holkham Gap (dead on shore) 31.10.74

ron

It is unusual for our herons to travel as far to the east as Belgium.

Usedom, Rostock, D.D.R. 20.5.73 — Fakenham (dead) 5.10.73
Kalvoya, Aust Agder, Norway
28.5.67 — Gooderstone, Nov. 1968
Texel, Netherlands 18.6.74 — Great Ryburgh 7.9.74
Wickhampton (pullus) 11.5.72 — Fievent, Clais, France 28.1.74
Wickhampton (pullus) 11.5.72 — Tisselt, Antwerpen, Belgium 2.1.74
Wickhampton (pullus) 5.6.73 — Lyndhurst, Hants 1.1.74

illard

Ringed birds shot in Norfolk in 1974 include two from Denmark.

geon

The recoveries in May and June are from approximately 65°E, or 1000 miles
more to the east of Moscow. The autumn recoveries not listed below are 5
m U.S.S.R., ranging from northern latitudes south to the Ukraine, and 4 from

Denmark, all shot in September or October, having previously been ringed at Snettisham or Dersingham. This gives some idea of the hazards facing wildfowl en route to their wintering quarters.

Snettisham 11.2.72	Elizarovo, Tyumen, U.S.S.R. 12.5.72
Dersingham 8.2.70	Labitnangi, Tyumen, U.S.S.R. 5.6.72
Snettisham 13.2.73	near Vorkuta, Komi U.S.S.R. 1.5.74
Snettisham 19.2.73	Oktyabr'skoye, Tyumen, U.S.S.R. 14.5.74
Snettisham 13.2.73	Taranovskoye, Kazakhstan U.S.S.R. 26.9.73
Snettisham 26.1.72	Insel Pellworm, Schleswig-Holstein, Germany Nov. 1974

Oystercatcher

Recoveries abroad are from Scandinavia, Norway in particular.

Lapwing

Friesland, Netherlands (pullus) 31.5.72	Hockwold 18.12.73

Grey Plover

The Wash 13.10.73	Huelva, Spain (killed) early Nov. 1974

Turnstone

In addition to the following, both firsts for ringing in Britain, Turnstone were reported from Greenland (2), Denmark and Iceland.

The Wash 11.8.71	Mesolongion, Greece (killed) 8.10.74
The Wash 4.8.74	Bolama, Guinea Bissau (killed) 10.9.74

nipe

Salthouse 19.8.72	Ivanov, U.S.S.R. (killed) 30.8.74

Woodcock

Jylland, Denmark (full-grown) 5.4.70	Norwich (shot) 13.1.73
Gravesend, Kent 24.10.70	Aylsham (killed) 21.11.74

ar-tailed Godwit

The Wash 3.8.73	Vlieland, Netherlands (control) 5.11.74
Londonderry, N.Ireland 26.10.73	The Wash (control) 8.8.74

not

Ringing on the Wash and elsewhere in Britain, and ringing and shooting in Iceland and Greenland produced further useful information on the species in 1974. Reports also came from elsewhere in Europe and two from the New World:

The Wash 6.9.63	Eureka, Ellesmere Is., Canada 23.6.74
The Wash 19.2.71	Alert, Ellesmere Is., Canada (control) 7.6.74

unlin

Scandinavia, the Atlantic seabord of Europe and Morocco provided recoveries of birds ringed on the Wash.

urlew Sandpiper

The Wash (Juv.) 2.9.69	Ukraine, U.S.S.R. (killed) 13.8.72

nderling

Now recognised as a very wide traveller; others were reported from N. France and Denmark.

Heacham 15.5.71	Camargue, S. France (control) 7.5.74
The Wash 22.8.70	Casablanca, Morocco (killed) 13.11.74
The Wash 9.5.71	R.Lena, Yakutsk, U.S.S.R. (127°E) 25.6.74

ack-headed Gull

The *Norfolk B.R.* 1973 mentions a Dutch-bred bird arriving by mid-August. The first on the list is another prompt arrival, and the second could conceivably have been newly arrived. It seems likely that if conditions are favourable, eastern populations will winter in Denmark or the Low Countries, rather than push further west.

Tostamaa, Estonia (juv.) 20.6.74	King's Lynn (dead on road) 28.8.74
Oiu, Estonia (pullus) 5.6.71	Breydon Water (dying) 27.8.73
Norwich 30.1.72	Elmshorn, Schleswig-Holstein, Germany, 21.11.74
Norwich 1.1.71	Korsor, Sjaelland, Denmark 27.2.74

rn Owl

Two broods provide interesting dispersal comparisons:

Caistor St. Edmunds 3.8.69	a. Lakenham (dead) 13.11.70
	b. Thornham Common (remains only) 12.8.74
Holkham 9.10.74	a. between Fakenham and Wells (dead) 24.11.74
	b. Black Drove, Wisbech, Cambs. 1.2.75

ort-eared Owl

Bergsatern, Kopparberg, Sweden (pullus) 11.7.73	Cley (killed) 19.10.73

ngfisher

Method of recovery is unusual in this case

Scolt Head 11.9.71	Scolt Head, (ring in owl's pellet) 22.4.74

Swallow

A bird ringed on the Norfolk coast features in the tragic wreck and subsequen airlift in central Europe. The other two suggest a landfall in E. England followed by a dispersal westwards.

Happisburgh 13.5.74	Switzerland (dying at Zurich Airport) 8.10.74
Happisburgh 18.5.74	Fort Brockenhurst, Hants 10.6.74
Happisburgh 20.5.74	Hornsea Mere, Yorks. 8.9.74

House Martin

The species tends to return to the same site annually.

Topsham, Devon (adult) 23.6.72	Neatishead (dead) 19.6.73

Sand Martin

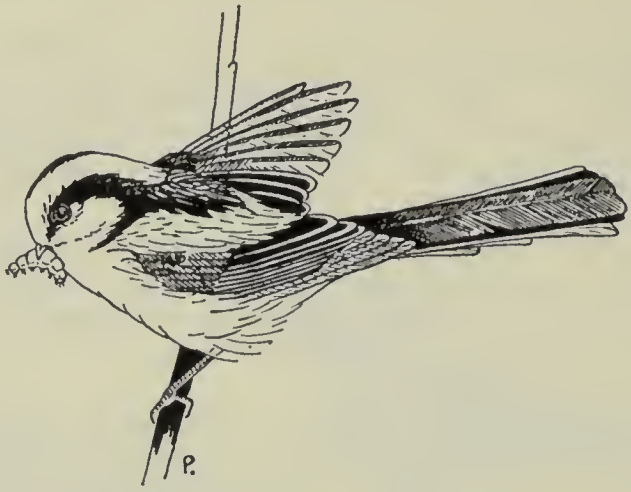
Downham Market 26.7.74	Bagnas, France (control) 20.9.74

Great Tit

Salthouse 19.9.72	Braintree, Essex (cat) 20.5.74

Long-tailed Tit

Three presumed autumn arrivals, ringed at Winterton 29.9.74, were controlled still together, at Titchwell 16.10.74, a distance of 76 km. See Norfolk B.R. 1973



Bearded Tit

This series of recoveries includes the first so far recorded to Belgium. The Norfolk-Suffolk movements are included as reminders of the typical movements revealed by ringing.

Salthouse 22.8.72	Rainham Marsh, Essex 20.1.74
Salthouse 18.9.73	Goole, Yorks. 13.7.74
Walberswick 16.9.73	Haddiscoe 1.1.74
Cantley 7.1.73	Walberswick, Suffolk 8.7.74
Cantley 31.12.73	Berendrecht, Antwerpen, Belgium (control) 13.8.74

Wren

Journeys of this distance are rare.

Adwick-le-Street, York 1.11.71	Shotesham (dead) 2.6.73
Titchwell 5.8.72	Deopham Green, Wymondham (dead) 2.12.73

Above: Among interesting Kingfisher observations was one fishing from a groyne at Hunstanton in January. As usual, there were autumn records along the Wensum in the centre of Norwich.

Below: Cantley Beet Factory settling ponds attract Snipe in large numbers; over 450 had assembled there at the beginning of September. (Photos by P. R. Clarke)

Long distance migrants: Sandwich Terns (*right*) which winter off West Africa and South Africa and Waxwing (*left*) from northern Europe.

(Photos by P. R. Clarke)

Fieldfare

See the note in *Norfolk B.R.* 1973 p.94 under Redwing.

Framingham Pigot 5.12.65	Chateaurenard, Bouches-du-Rhone, France (killed) 16.3.74

Song Thrush

Waxham (juv.) 30.9.72	Lucena, Cordova, Spain (caught) 10.11.73

Blackbird

The first on this list suggests two different landfalls in consecutive years, the second a dispersal movement on arrival in this country.

Winterton (juv.) 28.10.73	Margate, Kent (control) 21.10.74
Sandwich Bay, Kent 12.10.74	Titchwell (control) 1.11.74
Gaywood (pullus) 26.5.71	Horncastle, Lincs. 18.8.74
Utsira, Rogaland, Norway 20.10.73	Little Fransham (trapped, released) 3.1.74
Signilskar, Aland, Finland 18.10.73	Thurning (injured) 9.12.73
Tunstead 10.3.73	Schleswig-Holstein, Germany 28.4.74

Redstart

Millbrook, Derby (pullus) 5.6.71	Upper Hellesdon (dead) 22.4.74

Reed Warbler

Waxham 23.9.73	Cela Velha, Estremadura, Portugal 9.10.73

Sedge Warbler

Holme 5.8.71	Douar Drarine, Safi, Morocco 24.11.73

Garden Warbler

A north-westerly autumn movement, not unknown among such species.

Holme 9.10.74	Denton, Manchester (dead) 20.11.74

Goldcrest

Le Fougeraic, Sark, C.I. 17.10.73	Brundall (killed striking window) 29.4.74

Starling

The first comes from far to the north and east.

Norwich 29.12.72	Plesetesk, Arkhangelsk, U.S.S.R. 3.7.73
Costessey 3.3.73	Kajkowo, Olsztyn, Poland 15.3.74
Lincoln 21.12.72	Outer Dowsing L.V. 3.11.73

Greenfinch

Kalmthout, Antwerpen, Belgium 10.1.71	Holkham 21.5.73

Redpoll

Birds ringed at Leziate Sept. or Oct. were at Spalding and Grimsby in June, Kettering in Oct. and at Colchester (2) in Dec. Foreign recoveries were from France, Belgium (2) and Netherlands (2), and do not call for comment.

Haselmere, Surrey 28.11.73	Downham Market 11.5.74

Brambling

Movements to southern Europe are unusual, and to Italy exceptional.

Mintlyn, King's Lynn 18.2.74	Heligoland (control) 20.4.74
Mintlyn 30.12.73	Bilthoven, Utrecht, Netherlands 17.11.74
Mintlyn 30.12.73	Leognan, Gironde, France 16.10.74
Mintlyn 10.3.74	Tricesimo, Udine, Italy (control) 2.11.74
Downham Market 6.4.74	N. Friesian Is., Germany (dead) 5.5.74

Reed Bunting

This bird's recovery provides useful evidence for the recently discovered autumn movements into S.W. England.

Winterton 9.9.73	Budleigh Salterton, Devon (control) 17.11.73

Classified notes

These notes are based on *Birds of Norfolk* (1967) where fuller details regarding status, distribution, migration and ringing recoveries may be found. Important records for Wisbech Sewage Farm (part of which is on the Lincolnshire side of the county boundary) have been selected from the files of Cambridge Bird Club. Fuller details of Fens records may be found in the *Cambridge Bird Club Report* for 1974.

The order used is that of the B.T.O. guide *A Species List of British and Irish Birds* (1971) and English names follow current practice. Observations refer to 1974, unless otherwise stated. To save space, all but the most essential initials have been omitted. Records are of *single* birds unless otherwise stated.

Great Crested Grebe: The following counts of adults were submitted:
Broads: Horsey Mere 6, Mautby Decoy 2 (regular since 1968) and Fritton/Lound 10.
Brecks: Narford Lake 10-12 and Tottingham West Mere 2.
Other Lakes/Gravel Pits: Wortwell G.P. 4, Elmham Lake 2, Lenwade G.P. 2, Taverham G.P. 8, Sparham G.P. 2, Lyng G.P. 6, Lyng Easthaugh (Walnut Tree Farm) 2, Fustyweed G.P. 6, Tottenhill G.P. 1, Swanton Morley 8 and Gunton Park 2.

Red-necked Grebe: Wash: Snettisham Feb. 16th-17th. North: Hunstanton Sept. 29th. East: Winterton Sept. 15th and Nov. 19th.

Slavonian Grebe: Wash: Snettisham April 2nd. North: Hunstanton Jan. 10th, April 15th-26th; Holme Nov. 6th and Titchwell Nov. 1st and 13th.
Broads: Buckenham Feb. 17th; Martham Nov. 2nd and Hickling on 3rd.
East: Gorleston Jan. 5th.
Inland: Bawburgh G.P. April 8th (in full breeding plumage).

Black-necked Grebe: North: Brancaster Jan. 15th and Holme on 31st.
Wash: Hunstanton Jan. 13th and Feb. 21st; Snettisham 2 April 2nd.

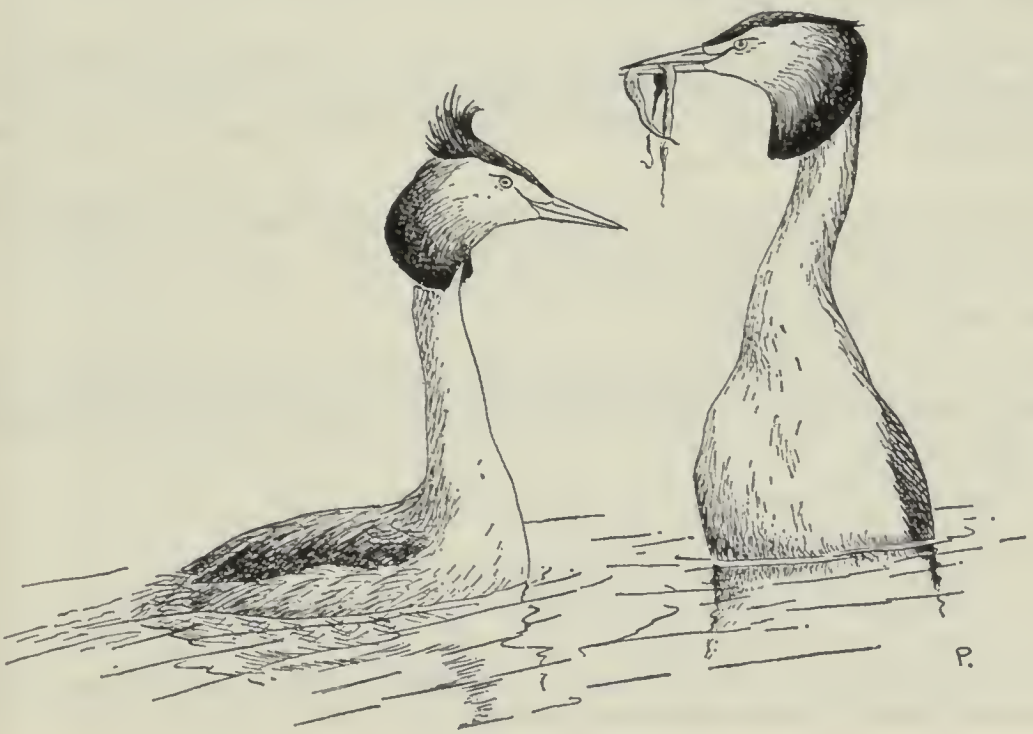
Little Grebe: Wash: Snettisham 40 wintered.

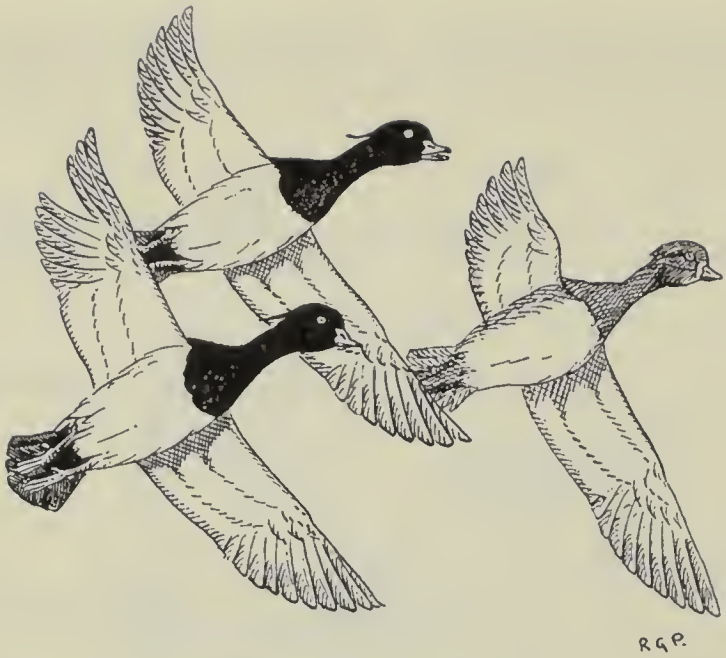
Fulmar: North: Total of 64 young counted on cliff ledges between Weybourne and Cromer as follows (JM):

Weybourne—Sheringham 23
Sheringham—West Runton 14
West Runton—East Runton 7
East Runton—Cromer 20

Total of 60 adults during breeding season on Cromer West Cliff. In fact Oct. was only month when not present. 2 returnedNov. 17th and at least 50 present two days later. A blue phase bird at Sheringham Sept. 25th.
Wash: Hunstanton 77 Feb. 25th and at least 13 young in June. First bird returned Nov. 24th.
East: Paston-Bacton 9 March 27th. Winterton-Horsey 2-3 regular over dunes in June and July.

Manx Shearwater: North: Cley-Salthouse 12 May 24th; 11 on 25th and up to 5 together between July 28th and Oct. 3rd. Wells March 16th. Weybourne May 4th. Titchwell Aug. 24th, Sept. 8th and 24th. East Runton July 17th. Sheringham 8 Sept. 14th and Holme Sept. 21st (3) and 22nd.
Wash: Hunstanton 7 Sept. 24th.
East: Waxham 4 May 17th and Winterton 3 July 28th.





Great Shearwater: East: Winterton Aug. 18th (PRA).

Sooty Shearwater: North: Cley, Aug. 4th, Oct. 5th and 12th. Weybourne/Sheringham Sept. 2nd and 8th, Oct. 4th and 5th. Titchwell Oct. 4th.
Wash: Hunstanton, Aug. 25th.

Storm Petrel: 17 occurred at the end of Oct. following severe northerly gales: North: Cley at least 5 Oct. 30th. Weybourne Oct. 29th and 30th. Sheringham Oct. 30th and Burnham Overy freshly dead Nov. 2nd.
East: Yarmouth Oct. 29th and at least 6 on 30th. Winterton, one long dead Nov. 19th.

Leach's Petrel: North: Salthouse Oct. 28th and Cley on 29th.
Wash: Hunstanton Oct. 29th.

Gannet: North: Impressive movements Sept. 24th in northerly gales when 250 east at Weybourne in an hour and 350 off Hunstanton.
Inland: Keswick Oct. 24th collided with overhead wires; another dead at Fring April 19th.

Cormorant: East: Maximum of 110 at Breydon during Dec.; 159 departing from Ranworth roost soon after sunrise Feb. 27th.
Wash: Ouse Mouth, maximum of 36 Jan. 14th.
Fens: Welney 10 Nov. 24th.

Shag: Coastal records between Snettisham and Winterton with maximum of 71 in Sheringham area Sept. 22nd following south-westerly gales. 6 roosting on Hunstanton cliffs in Dec.

Grey Heron: The following heronries were counted:
Borders of Wash: Snettisham 22 nests.
Fens: Hilgay 22, Islington 48 and Denver Sluice 5/6.
Brecks: Didlington 7, Shadwell 5, Narford 1/3.
Mid-Norfolk: Beetley Hall 1 and Colney 1.
Broads: Buckenham 31, Mautby Decoy 6, Wheatfen 12, Upton 5, Belaugh 10 and Reedham Park Carr (re-occupied after several years) 6.

A Purple Heron visited Strumpshaw in May whilst another remained over two weeks later in the year at Hickling.

urple Heron: Broads: Strumpshaw May 19th (RPM). Hickling: juvenile Aug. 17th Sept. 2nd.

ittle Egret: Broads: Following records doubtless relate to the same bird. Hickling ug. 2nd (AB), Horsey July 27th to 31st (JB) and Halvergate Aug. 21st to 25th (DHT).

ight Heron. Broads: Hickling Oct. 28th (GRSS).

ittern: East: Bure near "Stracey Arms", pair raised single young. Brecks: Stanford arch 3rd.

pooonbill: Fens/North/east coasts/Broads: Ones, twos and threes at Welney, isbech S.F. Holkham, Cley, Hickling, Hassingham and Breydon between April th and August 19th.

arganey: Spring arrival from March 17th at Cley and subsequently at Burgh astle and Breydon.

adwall: Largest Breck counts include 240 at Stanford Nov. 3rd, 200 at Narford ug. 30th, 30 at Didlington Dec. 15th, 27 at Fowl Mere Aug. 8th and 22 at Shadwell n. 4th.
entral: Scoulton Mere 75 Nov. 7th.

igeon: Fens. Welney 20,000 early in year and 17,000 in late Dec.
ast: Yare valley, 2,500 on single marsh Jan. 5th.
roads: St. Benet's level, 1,000 Jan. 19th.

ntail: Brecks: Up to 6 at Stanford, West Mere and Tottington.
ens: Welney, 2,000 end of Jan. and 1,500 had returned by late Dec.
ast: Breydon, peaks of 182 Jan. 27th and 216 Dec. 6th.

oveler: Breck counts include 45 at Mickle Mere Jan. 24th, 40 at Stanford Aug. 8th.
ens: Welney, 600 end of Jan. and 500 in late Dec.

ed-crested Pochard: Fens: Wisbech S.F. duck Nov. 2nd (JAWM).

aup: East: Breydon, maximum of 18 Jan. 13th.
ash: Snettisham late pair May 6th.

ufted Duck: Breeding records: Few Breck observations received, but elsewhere inimum of 35 pairs bred at eight sites including 15 broods at Welney in Fens.

Pochard: Breeding records: Two pairs bred in Brecks at one site. Elsewhere 7 pairs bred at six sites (Swanton Morley, Martham, How Hill, Alderfen, Ormesby and Horsey).

Goldeneye: Broads: Ormesby, Rollesby and Filby, total of 30 Feb. 23rd—an unusual number.

Long-tailed Duck: Wash: Hunstanton monthly maxima as follows: Jan. 40, Feb. 107, March 106, Oct. 4 and Nov. 28. Snettisham, Oct. 20th and Nov. 6th.
North coast: Occasional records of up to 7 until April 7th and from Sept. 2nd.
East: Gorleston, up to 6 until April 25th but only one from Oct. 28th. Waxham Aug. 27th.
Broads: Ormesby March 7th.

Velvet Scoter: Wash/North coasts: Recorded each month except June, July and Sept. No party exceeded 16 apart from 42 off Hunstanton May 8th where smaller numbers until 13th.
East: Gorleston monthly maxima Jan. 9, Feb. to April 1 and Nov. 3.

Common Scoter: Wash: Hunstanton maxima 1,200 in Nov. and 1,000 in Dec.
East: Gorleston maximum 30 March 4th and Oct. 30th.
Broads: Hardley Flood 5 April 12th.
Inland: Taverham 3 April 15th. Seamere April 17th and Lyng G.P. Aug. 18th.

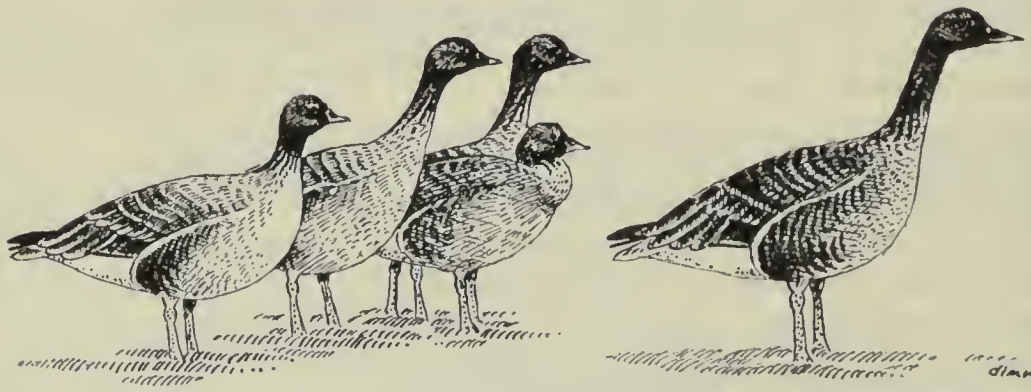
Eider: Coastal records each month and the largest flocks for main localities are given below:
East: Gorleston 37, Jan. and March.
North: Scolt Head 41. Titchwell 45 Oct. Hunstanton 45 Jan.
Wash: Ouse Mouth 1-10 during year.

Red-breasted Merganser: No numbers reported apart from The Wash where 20-30 at Snettisham at both ends of year.

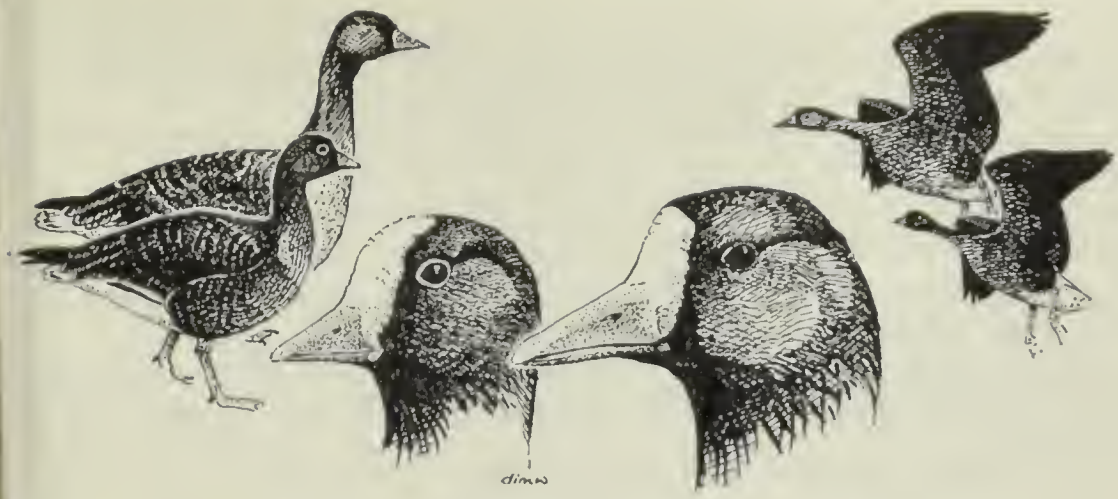
Goosander: Winter observations from 17 localities including 20 at Gunton Park, 9 at Narford, 9 at Stanford, 8 in Thornham harbour, 5 at Seamere, 7 off Cley and 5 at Didlington.

Smew: Winter records of singles at Fustyweed G.P. (until April 16th), Snettisham and Welney.

Shelduck: Wash: 3,000 assembled on mudflats near Snettisham beach in early July and moult migration took place between July 17th and 24th. Total of 200 young assembled off Ouse Mouth Aug. 30th.



Western Bean Goose (right) with party of Pink-feet. Note former's longer bill, head and neck, darker plumage and greater overall bulk compared with dainty, but rather dumpy appearance of Pink-feet. (D. I. M. Wallace)

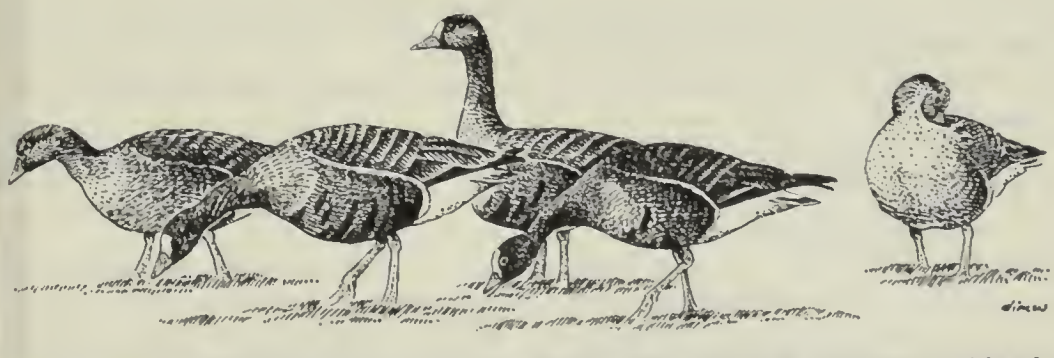


comparison of Lesser White-fronted Geese with European White-fronts: left, immatures, esser (in front) showing dark immaculate plumage, daintier appearance, long wings, nall bill and eye-ring; centre, heads of typical adults, Lesser (on left) distinguished by nall bill, large white blaze on head and brilliant yellow eye-ring (but note thin dull eye-ng visible on 20% of European White fronts); right, immatures taking off, Lesser again owing generally daintier and darker appearance. All size differences shown are extreme). I. M. Wallace).

ast: Breydon: Winter peak of 884 Dec. 15th (a record number for the estuary). teresting movement Oct. 29th when total of 97 north off Gorleston and 175 ssing Titchwell in two hours.

gyptian Goose: Reported at Beeston (141 in Feb.), Colney, Fustyweed, Gunton, illington, Lenwade, Lyng, Newton, Sparham, Stradsett, Swanton Morley and olkham (where 98 Sept. 1973).

hite-fronted Goose: East: Breydon area, maximum of 140 Jan. 12th (29 Jan. 4th re first arrivals) but quickly dispersed. Elsewhere in the Yare valley 30 Jan. 6th d peak of 48 on 13th.



sser White-fronted Goose (second from right) with family of European White-fronts. te former's daintier appearance, with noticeably rounded head, long wings and nimbler t. Note how variably plumage of grey geese catches light (D. I. M. Wallace).

North: Cley 18 Feb. 16th, 47 west Oct. 29th and 11 Dec. 29th. Holkham up to 150 from Jan. 8th to March 2nd; 5 returned by Nov. 17th later increasing to 29.
Fens: Welney, 11 for three weeks from end of Jan.

Bean Goose: East: Up to 109 in usual areas till Feb. 26th; 20 returned Dec. 7th and 74 from 8th.
North: (Titchwell and Holkham) 1-5 in Jan. and Nov. with 9 Dec. 9th.
Fens: Welney 4 Nov. 4th increasing to 8 by 23rd and 7 stayed till year end.

Pink-footed Goose: East: Winterton 5 Jan. 19th and 19 out to sea April 12th. Yare valley, immature with Bean Geese until Feb. 26th.
Wash: Snettisham area, peak of 2,400 (a record) in Dec. and 1784 (Jan.) last flock of 192 March 13th with 2 April 19th. Returned Oct. 21st and 100 present by end of month.
North: Holkham 100 Feb. 17th and 19 Dec. 15th.

Snow Goose: East: Single with Bean Geese until Feb. 26th. The possibility of an escape from a collection cannot be ruled out.

Brent Goose: Maximum numbers at regular localities as follows:
Breydon 5, Wells 250, Brancaster 1400, Salthouse 300, Hunstanton 375 and Terrington Marsh 400. Recorded every month except June including one at Titchwell July 23rd to 30th and Aug. 17th-18th. 150 were still present at Blakeney May 12th. At Brancaster 1,000 feeding on winter wheat in first week of Jan. By Feb. 8th the entire flock of 1,400 feeding either on wheat or cattle grazing areas behind the sea walls; large numbers continued feeding here until mid-March.

Barnacle Goose: East: Breydon/Halvergate 9 Jan. 10th-12th with 7 on 13th and 3 Dec. 28th. Yare valley: One with Bean Geese until Feb. 2nd.
North: Cley 2 March 21st. Sheringham 2 east Nov. 23rd. Holme Feb. 10th and 18th.

Whooper Swan: Recorded up to March 6th and from Oct. 31st at nine localities with largest herds at Welney where 38 in Jan. and 26 by end of the year.

Bewick's Swan: Recorded up to March 20th and from Oct. 7th. Largest concentration at Welney Washes where 900 by early Feb. and 578 present by Dec. 14th. Elsewhere, most impressive assemblies at Haddiscoe/Halvergate (78 Jan. 6th), Breydon (71 Dec. 15th), Muck Fleet (62 March 7th) and Fritton (135 Dec. 13th). In addition total of 171 (including 51 juveniles) in Haddiscoe, Thurlton, Halvergate, Hassingham and Fleggburgh areas March 10th.
In Brecks, maximum of 21 at Stanford and West Mere Jan. 27th.
Easterly spring exodus most noticeable March 2nd (29 over Honingham and 40 over Sheringham), 6th (28 Gorleston), 13th (18 Holme) 14th (24 Hunstanton) and 16th (35 Earlham).

Buzzard: North: Sheringham Feb. 28th and Sept. 29th. Cley Oct. 8th. Wells 2 April 25th and one during May. Glandford Dec. 2nd.
Wash (Wolferton, Sandringham and Snettisham) present until April 12th and in first week of Sept.
East: Breydon March 29th. Winterton 3 March 31st with singles April 7th and 14th and one summering between May 12th and Sept. 1st.
Central: Felthorpe twice in June.

Rough-legged Buzzard: An exceptional arrival in early October following large numbers in Oct. 1973. The records are given in detail:
East: Winterton-Horsey Gap, singles April 7th, 21st and 28th (considered different individuals), Oct. 13th and 20th with 2-4 regularly from Oct. 24th to Dec. 22nd. Hickling 2 Nov. 8th and one on 17th. Hardley Oct. 25th. Breydon Nov. 4th and Stokesby on 5th.

North: Cley-Salthouse, Feb. 3rd, March 17th, May 1st/3rd. Arrival from Oct. 12th and singles on 14 dates until Dec. 22nd. Salthouse Heath/Kelling Heath, Oct. 27th, 2 Nov. 1st-3rd and one on 6th. Blakeney Point May 1st and 4th and Oct. 26th. Blakeney/Blakeney harbour Nov. 3rd and 26th. Wells/Holkham Oct. 20th, 27th, 31st with 3 Nov. 13th and singles on 17th and Dec. 31st. Wiveton Oct. 27th with 3 Dec. 2nd. Glandford March 17th. Titchwell March, late Oct., Nov. and early Dec. Holme March 8th, April 12th, May 1st and 2 Nov. 1st. Hunstanton Nov. 10th Holt Dec. 9th and Overy Staithe Nov. 3rd.
Wash: (Wolferton, Sandringham and Snettisham) 2 during Jan. and Feb. with 3 Jan. 6th. Singles March 3rd, 16th and 19th and also April 6th and 11th.
Inland: Morley Jan. 19th (very sick and died on 21st). Ashwicken Dec. 15th (shot), West Mere Feb. 3rd and Nov. 3rd, Stanford 3 Jan. 27th, Ickburgh Feb. 23rd and Dec. 8th. Sturston Carr Feb. 23rd, Tottington Feb. 23rd, Lynford Nov. 10th, Marsham Heath Jan. 17th. North Creake Jan. 6th. Dersingham Jan. 15th with 2 Oct. 18th and 3 Nov. 4th and Docking Oct. 31st.

Sparrowhawk: Recorded from 44 localities, but successful breeding at only one site (near Holt). Unusual assembly of 8 in air together at Winterton April 10th the birds remaining until 14th.

Goshawk: North: Wells/Holkham May 5th and Nov. 24th.
East: Winterton 3 April 7th and one on 14th heading out to sea.
Breck: Munford Dec. 29th.

Red Kite: Singles at Crostwick Jan. 10th-11th (CA, CJL), Houghton March 4th (JC) and Swanton Abbot Dec. 26th (RML).

Black Kite: North: Ringstead Downs, May 11th (RL, RW).

Honey Buzzard: Successful breeding took place at one site and 3 young reared. Birds present between May 19th and early Sept.
Wash: Wolferton May 24th.
Central: Seamere July 12th.

Marsh Harrier: Broads (Hickling-Horsey area), none bred, but female resident all year and 2 males passed through in May. Elsewhere, noted at Cantley July 28th and Breydon May 19th.
North: Titchwell, almost daily in early May with 5-6 on 11th. Cley May 1st to 25th with 4 on two dates. Sheringham Aug. 24th. Brancaster 2 May 2nd until 9th and one until 14th.
East: Winterton May 12th/13th, Sept. 15th and Nov. 17th.
Wash: Pair present all summer.

Hen Harrier: Recorded up to late date of May 19th (female at Winterton) and from Oct. 10th. More records than usual from coastal localities including 5 together at Scolt Head (one male), 4 at Winterton April 7th, 5 at Dersingham (one male), 4 at Roydon Common and 4 at Sandringham; also 3 at East Wretham.

Montagu's Harrier: North: Female at the 1972 nesting site from April 29th carrying nesting materials on several occasions, but no male appeared; last noted June 20th. Additional passage birds May 1st and 19th.
Elsewhere, coastal records from Holme and Cley on six dates between April 30th and Aug. 16th.
Wash: Male on four dates between May 23rd and June 1st.

Osprey: Ten records of singles at Cley, Barton, Alderfen, Stanford, Pentney, Lyng and How Hill between April 21st and Oct. 25th. At Lyng G.P. one remained three weeks from Aug. 23rd.

Hobby: North: Cley May 8th and 27th and Sept. 10th/11th. Wells Aug. 1st. Kelling July 21st and Holme Sept. 11th.
Wash: Snettisham July 23rd. Breck: Weeting June 5th and North: Beeston Common June 7th.
Peregrine: North: Singles at Cley, Brancaster, Sheringham and Scolt Head on six dates. The Scolt bird remained most of Jan.
East: Breydon Dec. 14th.
Merlin: Ones and twos at nine localities until April 7th and from Oct. 31st.
Red-footed Falcon: North: Wells/Holkham June 16th (DJH) and Holme May 17th (HBO).

Quail: Early July records from East Wretham and Docking.
Golden Pheasant: Recorded at Sandringham, Holkham, Santon Downham, Swaffham Heath, St. Helen's Well, Shadwell, West Tofts, Roudham, West Harling and East Wretham.
Crane: East: Waxham, end of April. A photograph submitted was adequate for identification.
Spotted Crake: North: Cley singles May 5th and Aug. 12th.
Corncrake: East: Hempstead May 24th. North: Salthouse Heath May 29th.
Oystercatcher: Breeding records of *pairs* include:
East: Breydon area 4.
Broads: Horsey 3.
North: Blakeney Point 120, Stiffkey Binks 6, Wells 13, Scolt Head 150 and Brancaster Golf Course 5.
Ringed Plover: Breeding records of *pairs* include:
East: Hemsby to Waxham 16.
North: Blakeney Point 130, Wells 8, Scolt Head 100-110.
Wash- Snettisham 15.
Breck: Gooderstone 2, Bodney 1, South Pickenham 1.
Fen Border: Pentney 2 and Bawsey/Mintlyn 5.
Passage maximum of 120 at Wisbech S.F. Sept. 14th-16th.
Little Ringed Plover: *Breeding:* Total of at least 9 pairs at 6 sites; minimum of 14 young reared. First recorded in spring at Colney G.P. April 7th. Passage migrants widespread in autumn with records from Cantley B.F. (maximum of 10), Holkham, Holme, Wisbech S.F. (maximum of 11) Hickling, Swanton Morley G.P., Wissington B.F. and Winterton. Latest record Sept. 30th at Wisbech S.F.
Further reading: Little Ringed Plovers in Britain in 1968-73 (*British Birds* Vol. 68 pp. 359-368.
Kentish Plover: North: Cley female April 14th to May 11th, May 25th/27th and June 18th to 23rd with a male present April 28th and May 10th/11th; another August 19th. Titchwell immature Aug. 16th to 26th. Holme one west Sept. 11th.
East: Breydon male May 12th/13th.
Grey Plover: Fens: Wisbech S.F. unusual record of 89 flying overhead July 20th (DH).
Lesser Golden Plover: Fens: Wisbech S.F. Aug. 10th (JAWM). The first county record.
Dotterel: Spring total of 23 as follows: Snettisham April 29th, Egmere 12 May 12th, Sea Palling 9 May 12th-15th and Cromer golf course May 30th.
In autumn at Wisbech S.F. Aug. 24th and Sept. 1st and Kelling Heath Sept. 8th.
Turnstone: Central: Swanton Morley G.P. May 27th. Fens: Wisbech S.F. autumn peak of 19 Aug. 31st.
Snipe: East: Cantley B.F. concentration of 450 to 500 Sept. 1st.
Jack Snipe: Last spring birds at Winterton April 13th and at Martham Broad (2) on 16th. One observed flying in off sea at Cley Sept. 10th.

Curlew: West: Roydon Common 3 pairs summered but no proof of breeding. No Breckland information received.

Whimbrel: Late birds at Titchwell Oct. 24th/25th, Blakeney Point Oct. 26th, Cley Nov. 2nd and Breydon Nov. 4th.

Black-tailed Godwit: Passage birds between March 6th and Nov. 17th.

Breeding: Fens: Welney 3 pairs but only 3 young seen at any one time (45 pairs along total length of Ouse Washes).

North: Cley pair summered but no young reared.

Bar-tailed Godwit: Fens. Wisbech S.F. 20 April 20th and ones and twos between Aug. and Oct. East: Breydon spring peak 92 April 28th.

Green Sandpiper: Maximum numbers at Cantley B.F. where up to 15 late July and Aug. One at Winterton June 2nd to July 14th.

Wood Sandpiper. Largest numbers recorded at Wisbech S.F. where maximum of 9 Sept. 6th. A late bird at Cley Nov. 1st/2nd. One in display flight at Winterton June 16th.

Common Sandpiper: Largest concentrations recorded at Wisbech S.F. where maximum of 45 Sept. 9th. Last, at Scamere, Nov. 17th.

Redshank: North: Breeding records include 7 pairs in terneries at Blakeney Point and 40 pairs at Scolt Head.

Spotted Redshank: Winter records from Cley, Brancaster and Gore Point. During autumn largest numbers at Wisbech S.F. where maxima of 36 Aug. 22nd, 28 Sept. 14th and 30 Sept. 30th Other inland records include 8 at Cantley B.F. on the unusual date of June 13th with 3 at the same locality Aug. 25th/26th and 7 at Swanton Morley G.P. Sept. 27th.

Greenshank: Largest concentrations at Holme where maximum of 34 Sept. 14th and where one or two daily until Nov. 4th. A wintering bird at Thornham Nov.-Dec. Fens: Wisbech S.F. autumn peak of 13 Aug. 22nd.

Purple Sandpiper: In first winter period records from Hunstanton (4), Sheringham (2) and Heacham (1) where latest April 12th with a late bird at Salthouse May 18th-23rd.

In second winter period recorded from Aug. 17th with up to 6 at Hunstanton Nov.-Dec., 2 at Titchwell Aug.-Nov. and 3 at Sheringham Sept. - Dec. Elsewhere irregular records of singles at Cley Aug.-Oct. and isolated records from Snettisham, Holme, Weybourne, Winterton, Caister-on-Sea and Yarmouth.

Little Stint: During the spring singles at Wisbech S.F. March 16th and June 8th, up to 4 at Cley May 11th-27th with one June 22nd and at Winterton June 16th. Also 4 in summer plumage at Scolt July 3rd.

In autumn recorded July 19th-Oct. 29th with the largest numbers at Wisbech S.F. where maximum of 15 Sept. 6th.

Temminck's Stint: Spring: Cley April 18th and up to 5 May 9th-June 9th including a pair in display June 1st; Wisbech S.F. May 12th and Hickling 2 May 30th. Only one autumn record: Wisbech S.F. Sept. 6th.

Pectoral Sandpiper: North: Cley May 9th/10th. The second county spring record. Fens: Wisbech S.F. July 16th to Aug. 2nd.

Dunlin: Fens: Wisbech S.F. large numbers on autumn passage where monthly maxima as follows: Aug. 340, Sept. 700 and Oct. 450.

Curlew-Sandpiper: Only reported in spring at Cley where up to 3 May 18th-22nd and singly May 28th and June 22nd.

In autumn generally in small numbers except at Wibsech S.F. where maximum of 43 Aug. 9th. Elsewhere, 16 at Cley Aug. 16th and 6-7 at Wissington B.F. Aug. 18th.

Sanderling: Wash: Largest concentrations at Snettisham where 600-800 July 20th. Fens: Wisbech S.F. May 7th.

Ruff: Breeding: Fens: Welney 2 pairs bred with 3 young present in late June. Winter records from Cley (up to 20), Wisbech S.F. (12 in Dec.) and Welney (100 in Jan. and 200 in late Feb.). Largest concentrations on autumn passage at Cley where maxim of 100 in mid-Sept. and Wisbech S.F. where monthly maxima as follows: July 60, Aug. 150, Sept. 240, Oct. 70 and Nov. 55.

Avocet: East: Breydon 2 April 22nd-27th, 3 on 28th, 7 May 5th and one Aug. 20th.
North: Sheringham 7 east May 5th. Cley/Salthouse one March 31st and April 4th-9th, 2 April 11th-15th and May 3rd and 27 May 4th decreasing to 2 May 8th-15th.
Wash: Snettisham 9 during first week of May. Ouse Mouth May 6th.
Fens: Great Ouse Downham Market March 30th.

Grey Phalarope: East: Gorleston Oct. 29th and Yarmouth Oct. 30th.
North: Sheringham Oct. 28th (where one found freshly dead on beach March 3rd). Cley/Salthouse Sept. 24th to Oct. 7th and Oct. 28th. Wells harbour Oct. 26th.
Fens: Wisbech S.F. Sept. 8th-10th.

Red-necked Phalarope: North: Cley May 26th, June 18th-23rd, July 16th/17th and Sept. 30th-Oct. 7th.
Fens: Wisbech S.F. Aug. 10th.

Stone Curlew: Very few records received. Observers are requested to submit all records for 1975 so that the status of this declining breeding species can be established —no specific nesting sites will be published.
In Breck, a pair reached Bodney Lodge Feb. 4th.

Black-winged Pratincole: North: Salthouse Heath Aug. 25th (MIV, AB, PJD) and subsequently at Cley 27th (MJW) and Salthouse on 28th (GED). The second county record of this vagrant from South-eastern Europe.

Great Skua: Wash: North Wootton Aug. 18th.
North: No records received earlier than Sept. 24th when 170 off Hunstanton, 126 off Holme, 110 west at Titchwell, 50 west at Weybourne and 139 off Sheringham during north-westerly gales. During Oct. several records of singles at Cley with 18 at Titchwell on 22nd and 5 at Salthouse on 29th. A late bird at Titchwell Nov. 26th.

Pomarine Skua: East: Winterton Sept. 15th and Yarmouth Oct. 15th.
North: West Runton Sept. 8th, Sheringham adult March 11th, 4 Sept. 24th, 22 east Oct. 28th/29th. Weybourne Sept. 8th and 10 east Sept. 24th. Salthouse Oct. 23rd. Cley Aug. 28th, Sept. 12th and 2 Oct. 20th. Blakeney Point Sept. 6th. Titchwell Sept. 25th and Holme 2 Sept. 24th. and Oct. 10th.

Arctic Skua: Spring: Snettisham 2 April 7th.
Autumn records from North coast between July 21st and Nov. 4th with maximum numbers on Sept. 24th during north-westerly gales when 67 off Hunstanton and 97 east at Sheringham.

Herring Gull: North: Blakeney Point one nest and 2 young reared. Scolt Head pair present all season but no nest.
Broads: Hickling, one with yellow legs Aug. 6th (MJS).

Common Gull: North: Single pairs nested at Blakeney Point and at Scolt Head, but young fledged only at latter locality.

Glaucous Gull: East: Gorleston March 4th, Oct. 28th and Nov. 25th. Winterton Oct. 17th and Caister-on-Sea Nov. 29th.
North: In first winter period 2 at Cley/Weybourne up to March 17th on which date 3 at Hunstanton. Again recorded in ones and twos from Sept. 10th until end of year along coast between Hunstanton and Sheringham with an influx of at least 7 at Cley/Salthouse Oct. 27th-Nov. 2nd associated with northerly gales.

Iceland Gull: East: Winterton immature Nov. 3rd (PRA, AB).

Mediterranean Gull: East: Yarmouth/Gorleston adult at harbour mouth Oct. 11th (DRM) and 29th/30th (PRA, AB).

Little Gull: Recorded all months except Feb., March and Dec. with the majority of records May to Oct. from The Wash, North and East coasts, Hickling Broad and Wisbech S.F. Largest numbers as follows: Hunstanton 12 Sept. 29th and Oct. 6th, Cley 10 June 1st with 13 June 16th and Sheringham 10 Oct. 22nd, 30 on 28th and 14 on 29th (during northerly gale).
Inland: Norwich adult circling overhead insect-catching with Black-headed Gulls Aug. 2nd.

Sabine's Gull: North: Autumn total of 10 as follows: Holme Sept. 13th and 24th, Blakeney Point Oct. 12th, Cley Oct. 8th with 2 on 12th and also on 30th and Sheringham Oct. 28th/29th.

Kittiwake: North/East coasts: 1973 attempted breeding site collapsed in June; no further evidence of nesting.

Black Tern: Spring passage April 30th to May 31st with largest movements at Cley where 50 May 16th and 150 next day. Lynn Cut 8 June 26th.
Autumn movements Aug. 28th to Oct. 23rd in small numbers with maximum of 225 at Wisbech S.F. Sept. 23rd.

White-winged Black Tern: North: Titchwell immature Sept. 4th (AP).

Gull-billed Tern: North: Blakeney Aug. 25th (JAH), 2 at Cley Sept. 28th (MJA, AVM) and Thornham/Holme Oct. 14th (WNL).

Common Tern: Number of *pairs* at breeding sites include the following (where number of flying young submitted these are included in brackets):
Wash: Snettisham 54 (67).
North: Brancaster 5 (2). Scolt Head 600-625 (minimum of 150-175). Lodge Marsh Wells 20-25. Blakeney Point 1500 (number of fledged young not known but warden reports some birds did not fly until Sept. 2nd, the latest date in 40 years). Stiffkey Binks 96.
East: Scroby 56 (only few fledged due to high tides).
Broads: Ranworth 46 (68). Ormesby 5 (8). How Hill 1. Hardley Flood 11 (27). Hoveton Great Broad 2.
Inland: Swanton Morley G.P. 2 (5). Lyng G.P. 1 (3). Lenwade G.P. 1 and Colney G.P. 2 (2).

Arctic Tern: North: Breeding pairs: Scolt 1, Stiffkey Binks 1 and Blakeney Point 3. Late birds at Sheringham and Titchwell Oct. 28th.

Little Tern: Breeding records of *pairs* (number of flying young indicated in brackets where known) include:
North: Titchwell 33 pairs (12). Scolt Head 62 (38). Lodge Marsh Wells 8. Blakeney Point 180 (breeding success low due to predation by pair of kestrels). Holkham 5, Stiffkey Binks 11 and Cley 2.
East: Winterton/Horsey 78 (179) and Horsey/Waxham 4.
First spring record at Holme April 16th. Latest at Holme 3 Sept. 24th and Hunstanton Oct. 5th (MR). Inland: Lyng G.P. April 29th.
Correction: 1973 Report, 15-20 pairs nested at Thornham and not 6; 25 pairs failed to rear any young at Titchwell.

Sandwich Tern: Breeding: North: 1610 pairs at Scolt Head (with a minimum of 1700 flying young) and 1375 pairs at Stiffkey Binks.
Earliest record at Brancaster March 28th and latest at Titchwell Nov. 1st. In addition, a recently dead one at Happisburgh Feb. 13th which had been ringed on Farne Islands 14th July 1972; on previous day another recovered in East Lothian.

Little Auk: Unprecedented numbers appeared Oct. 28th-31st with severe northerly to north-westerly gales. All birds observed in East Norfolk were flying north and those watched along the North coast were heading west. Very few appeared in N.W. Norfolk or The Wash. The birds were frequently caught up with flocks of starlings and waders. Several wrecked birds were recovered. All records received are given:
East: Yarmouth/Gorleston 2 inland with Starlings Oct. 28th, 38 north in three hours on 29th, 46 north on 30th and one north on 31st. Winterton one Oct. 13th and another inland with Starlings Oct. 24th which later returned to sea.
North: Sheringham 6 west Oct. 28th, 130 west on 29th in approx. seven hours (parties up to 6), 102 west on 30th in 7 hours (parties up to 8) and 2 west on 31st. Weybourne 81 west in three hours Oct. 29th. Cley/Salthouse one Oct. 26th, 26 on 27th, 14 west on 28th, 110 west on 29th (including one north over the coast road), 57 west on 30th, 11 west on 31st and one Nov. 1st; also one stranded at Salthouse Nov. 2nd which later died. Titchwell one west Oct. 30th and 4 west on 31st. Holme 2 with flock of Dunlin over Broadwater Oct. 29th.
Wash: Snettisham one Oct. 30th.
Fens: Welney, one Oct. 24th.
Wrecked birds were found at Fleggburgh in a sugar-beet field and at Felmingham Hall near North Walsham Oct. 31st, at Aldeby Nov. 1st, Hapton in ploughed field and Hargham on 2nd, Roughton on 3rd and Brancaster Harbour on 25th.

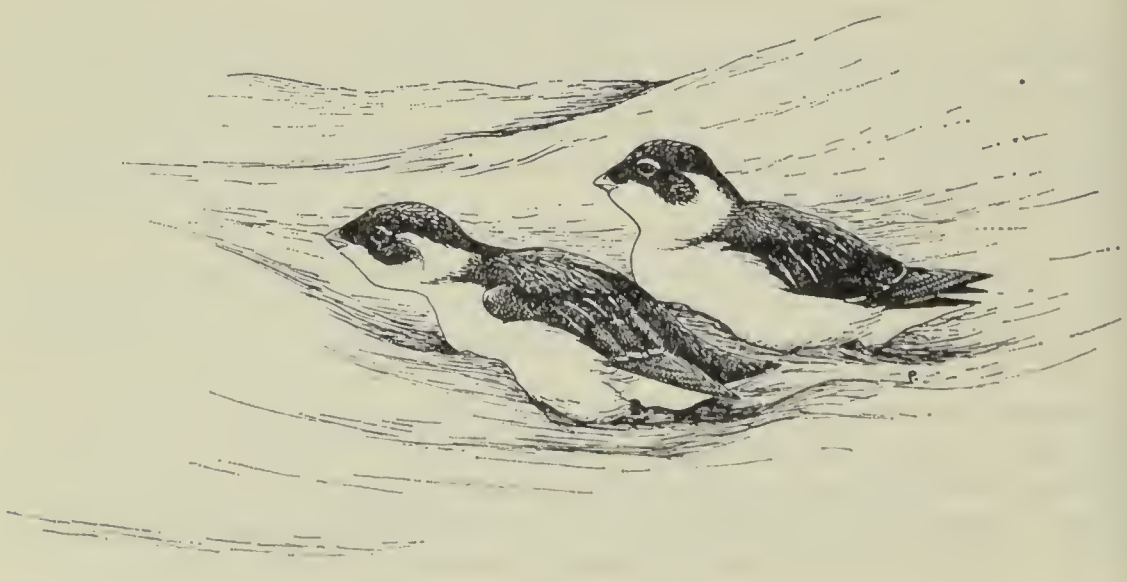
Guillemot: North: Titchwell a bridled variety freshly dead March 29th.

Black Guillemot: Six occurrences as follows:
North: Cley Sept. 14th, Wells harbour Oct. 26th and Dec. 5th-7th and Sheringham April 14th, Sept. 25th and Oct. 19th.

Puffin: North: Cley dead on beach May 19th and Titchwell Sept. 8th.
Wash: Hunstanton 2 July 11th and Terrington Feb. 24th.

Turtle Dove: Extreme dates April 21st (St. Helen's Well) and Oct. 9th (Holme). Notable passage records include Winterton 97 north May 26th; Cley 146 west May 27th and Brancaster 100 west May 28th.

Palm Dove (*S. senegalensis*): Fens: West Walton, present May 14th to July 26th (HPC). This record has been accepted by *British Birds* Rarities Committee and is in the hands of the B.O.U. Records Committee. If accepted it will be the first British record of this Mediterranean species.



Collared Dove: Continues to increase and gatherings include 150 at Downham Market Feb. 20th and 200 at Carrow Norwich Jan./Feb. Noteworthy record of one on drilling rig *Transocean* 85 miles north-east of Yarmouth June 4th.

Barn Owl: Noted at 71 localities.

Little Owl: Recorded at 17 localities.

Long-eared Owl: Bred successfully at Winterton and near Brandon. Breeding season records from East Wretham, Shouldham, Horsford, Kelling Heath and Cley. Elsewhere single migrants at Cley and Holme.

Short-eared Owl: Only breeding record from The Wash where a pair raised 3 young. In Nov.-Dec. many records of wintering birds including 5 at Lynn Point, 14 at Snettisham, 7 at Holme and 11 at Halvergate.
Noticeable influx Oct. 28th-30th when 15 in from the sea at Sheringham, 1 at Weybourne, 2 at Yarmouth and 1 at Gorleston.

Nightjar: Reported from May 18th. Bred as usual in Breckland, but records very incomplete. In West, total of 6 pairs at Dersingham, Roydon Common, Sandringham and Shouldham. In North, 4 males on Salthouse Heath and a single pair on Kelling Heath. In Central, 3 pairs at Horsford.

Swift: An interesting record concerns 2 on the drilling rig *Transocean* 85 miles north-east of Yarmouth June 4th. At least 1,000 circling Norwich during the evening of Aug. 2nd. Two Oct. records: Toftwood on 3rd and Holkham on 13th.

Alpine Swift: North: Two records: Cley May 17th (MAB., RAR, PD) and Stiffkey Sept. 23rd (RH *et al*).

Kingfisher: Recorded at 56 localities.

Hoopoe: In Spring at Stokesby March 23rd, Salthouse Heath May 5th and June 8th/9th, Snettisham May 9th, Rockland Broad and Surlingham June 3rd.
Autumn records may well refer to the same individual: Brancaster G.C. Aug. 30th, Holme Sept. 12th and Heacham from end of Sept. until Oct. 13th.

Lesser Spotted Woodpecker: Recorded at 33 localities, of which the following were not included in the 1968 N.B.R. Summary: Barnham Cross Common, Bintree, Brandon, Buckenham, Colney, Croxton Heath, East Tuddenham, Eaton, Felbrigg, Felthorpe Hall, Fowl Mere, Holt, Hoveton, How Hill, Lenwade, Loddon, Lynn Lodges, Morley St. Botolph, North Pickenham, North Walsham, Old Catton, Ranworth Broad, Ringstead Downs, Roman Camp, Shadwell, Sheringham, Surlingham, Thetford, Titchwell, Trunch, Weeting, West Walton and Yarmouth.

Wryneck: Five coastal records in spring: Happisburgh April 28th, Holme April 28th/29th, Sheringham on 29th, Salthouse Heath on 30th and Wells May 5th.
Total of at least 30 in the autumn with the majority arriving Aug. 30/31st. Noted at Blakeney Point, Brancaster, Breydon, Cley, Corpusty, Gorleston Holme, Honing Common, Hunstanton, Lang Mere, Paston, Scarning, Sheringham, Titchwell, Wells, Weybourne, Winterton and Yarmouth.

Woodlark: Eleven pairs located in Brecks at the following sites: Brandon, Broom Covert, Santon Downham, Stanford and Tommy's Belt. Elsewhere recorded in North as follows: Holkham 2 March 25th and 1 April 7th; Burnham Overy April 23rd, Salthouse Heath May 11th and Sheringham G.C. singing June 29th and July 13th.

Shorelark: North: Recorded at Blakeney Point, Brancaster, Cley, Holme, Hunstanton G.C., Salthouse, Scolt Head, Titchwell and West Runton. Maxima in early part of year at Scolt Head (75), Titchwell (34) and Brancaster (20); in latter months at Blakeney Point (20). Extreme dates May 10th (West Runton) and Oct. 3rd (Cley).
East: Gorleston 4 Oct. 30th, Breydon 2 Nov. 4th and 1 on 23rd and Winterton Nov. 19th.

Swallow: Spring arrival from March 27th (Crostwick). Complete albino at Brancaster Aug. 9th and 24th. More Nov. records than usual with sightings at 11 localities including 9 at Haddiscoe on 15th. Singles at Sheringham Dec. 1st and at Ormesby on 5th.

House Martin: Large breeding colonies at Rudham Grange (110 nests on old railway gatehouse where up to 199 in the past) and along the Relief Channel near King's Lynn (where 130 nests on Saddlebow Bridge and 70 nests on Tail Sluice). Albinos at Saxthorpe Aug. 31st and at Barton Turf on Sept. 5th (2).
As with Swallow more numerous in Nov. than usual with up to 6 recorded at 9 localities and one over Mundesley cliffs Dec. 1st.

Golden Oriole: Reported from three localities in mid-summer: Surlingham (2 singing males May 30th - June 1st), Wells (June 7th) and Heckingham (July 9th). Breck borders: No evidence of nesting.

Raven: North: Warham May 11th (AD). Full description provided. The second county record in three years, but only the second since 1953.

Carrion Crow: West: Roydon Common, winter roost of up to 200 birds.

Hooded Crow: As usual, majority of records from the coast including 20 at Wolferton Jan. 13th and remarkable total of 40 in a single dead tree at Winterton April 7th. At Roydon Common 6 were roosting with Carrion Crows.

Jay: North: Brancaster: one west with a flock of Fieldfares May 1st.

Long-tailed Tit: Oct. coastal movements include 40 at Sheringham Oct. 15th which appeared to have arrived from the north-east and moved inland and 30 at Holme on 17th.

Bearded Tit: Broads: Bred at Hickling, Whiteslea, Heigham Sounds, Horsey, Starch Grass, Martham, Hardley and Catfield Fen.
North: Bred at Titchwell and Cley (where 63 in reeds by East Bank following heavy rain July 5th).

Above: Good localities for Green Sandpipers include Wisbech sewage farm, Cantley Beet Factory and Hickling wader grounds. (Photo by B. Dockerill)

Below: Curlews favour Breydon, Brancaster, Blakeney and the Wash. (Photo by P. R. Clarke)

Two regular autumn 'drift' migrants from Scandinavia: Pied Flycatcher (*left*) and Wryneck (*right*). Both were photographed at Holme.
(Photos by Dr R. Vaughan)

Migrants recorded as follows: Hunstanton 15 SW Nov. 3rd. Holme 11 Sept. 29th increasing to 20 by Oct. 6th and to 40 on 7th which remained until 11th. Titchwell 70 in Nov./Dec. Brancaster 10 west Sept. 29th. Winterton/Horsey Gap up to 7 only Oct. 8th-20th. Weybourne in reeds April 4th.

Black-bellied Dipper: More widespread than usual with records at seven localities: Briggate Mill Jan. 25th to March 3rd; Ebridge Mill Feb. 5th to 27th; Elsing Mill Jan. 1st to Feb. 1st; Honingham Oct. 1973 to March 10th and from Dec. 22nd; Keswick Mill Feb. 18th; Shotesham mid-Jan. and Taverham March 1st to 8th.

Fieldfare: Spring departure later than usual with many May records, the last at Ormesby on 23rd and Salthouse Heath on 28th (2). Also an injured bird at The Hangs June 7th and another at King's Lynn from 10th until Sept. First autumn birds at Ringstead Aug. 25th.

Redwing: Extreme dates Winterton May 17th and Blakeney Point Aug. 30th.

Ring Ouzel: Spring: At least 130 recorded with more records than usual from inland. Maximum counts included 27 at Winterton April 30th (the largest party to date in the county), 12 at Sidestrand May 8th and 17 at Snettisham on 9th. One at Buckenham April 27th/28th was in song. A late male at Titchwell June 3rd. Otherwise records from March 17th at Blakeney Point, Brancaster, Burnham Overy, Cley, Costessey, Coxford Heath, Dersingham, Gorleston, Happisburgh, Holkham, Holme, How Hill, Hunstanton, Paston, Ringstead Downs, Roydon Common, Salthouse Heath, Sheringham, Weeting Heath, Wells, West Mere, Weybourne and Wolferton.

Autumn: Ones and twos between Sept. 27th and Oct. 27th at Holme, Titchwell, Wells, Winterton and Yarmouth.

Wheatear: Extreme dates March 17th (Tottington) and Oct. 20th (Happisburgh).

Stonechat: East: 6 pairs in Winterton-Horsey area were the only breeding records received.

More abundant than usual in autumn and winter and recorded at 33 localities, the majority coastal, with maximum counts of 10 at Happisburgh Oct. 7th-14th and 5 at Breydon Nov. 4th.

Wash: Snettisham, male Nov. 4th showed the characteristics of one of the eastern races (GBB).

Whinchat: No breeding reports received. Late birds at Holme Oct. 14th, Cley on 15th, Blakeney on 16th and Happisburgh on 18th.

Redstart: Extreme dates April 19th (Chedgrave) and Oct. 25th (Yarmouth). Breeding season records from Sandringham May 31st (male singing), Castle Acre early June (in song for a week), Sturston June 30th and July 27th (female seen) and Sheringham May 28th to June 15th (1-2 singing males only).

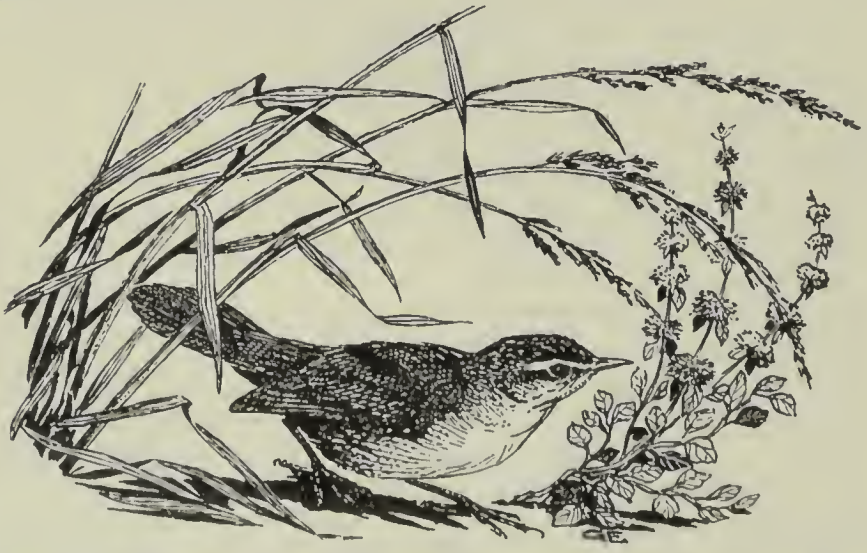
Black Redstart: Breeding: Yarmouth 9 singing males located (the first on the early date of April 4th), but only 2 pairs bred successfully, including one at Riverside Gorleston. Norwich: 2 singing males, but no proof of breeding. Wissington B.F. pair bred successfully.

Migrants: Apart from one at Burnham Overy Jan. 1st, total of 29 spring passage birds noted from March 11th at Beeston, Blakeney Point, Brancaster, Breydon, Colney G.P., Gorleston, Heacham, Holkham, Hunstanton, Holme, Paston, Sheringham, Snettisham, Wells and Weybourne. Total of 32 autumn migrants recorded from Aug. 31st, with the majority in Oct. and Dec. occurrences at Cromer (30th) and at Sheringham (female between 10th and 15th and a male on 28th).

Nightingale: North: An increase compared with 1973 at Salthouse Heath where 8 singing males located.

Bluethroat: North: Sole record relates to a male at Cley May 16th. Not for many years has the species been unrecorded in autumn.

Cetti's Warbler: Broads: Yare valley, male singing at one locality from May 14th (RPM) and a pair bred successfully (BJW). Highly distinctive song recorded in July, Oct., Nov. and Dec. at five localities.
North: Holme a migrant trapped and ringed Oct. 15th (HBO).
Further Reading: "The spread of Cetti's Warbler in north-west Europe" (*British Birds* Vol 68 pp 393-408).
Savi's Warbler: Broads: Hickling one singing June 14th to 16th (JC).
Icterine Warbler: North: Wells Aug. 4th, 27th, 31st and Sept. 3rd; Blakeney Point Aug. 26th, 30th, 31st (2) and Titchwell Aug. 31st.
East: Gorleston (South Pier) Aug. 24th; Yarmouth Aug. 30th (2) 31st and Sept. 1st.
Blackcap: No Jan./Feb. records, but at least 8 in Nov. and 2 in Dec. at Sheringham (3rd) and Wells (8th).
Barred Warbler: North: Singles at Hunstanton G.C. Aug. 19th-23rd and 30th-Sept. 2nd; Weybourne Aug. 26th; Titchwell Aug. 31st; West Runton Sept. 12th; Cley Oct. 3rd; Wells Oct. 7th and 13th.
Garden Warbler: Two unusual Nov. records: Yarmouth (5th) and Holme (17th-19th).
Lesser Whitethroat: North: Late bird at Sheringham Oct. 29th.
Subalpine Warbler: North: Lower Bodham Holt April 10th (LBL). The fourth county record and the first since 1960.
Willow Warbler: Late birds at Blakeney Point Nov. 1st and at Dersingham on 6th.
Greenish Warbler: North: Wells Sept. 3rd (DB, BWJ).
Chiffchaff: Extreme dates March 10th (Cley) and Nov. 19th (Holkham and Titchwell). One showing the characteristics of one of the Northern races at Cley Oct. 31st-Nov. 1st.
Wood Warbler: Spring arrival from May 11th (Wells). Breeding season records from Kelling (2-3 singing) and Shouldham Forest.
Single autumn migrant at Sheringham Aug. 30th.
Bonelli's Warbler: East: Yarmouth Aug. 30th to Sept. 2nd (PRA, GED, DJH *et al*). the third county record.
Yellow-browed Warbler: North: Wells Oct. 7th, 13th, 17th, 19th-27th; Titchwell trapped and ringed Nov. 12th.
East: Happisburgh trapped and ringed Oct. 10th; Yarmouth Oct. 10th/11th and 29th/31st.



Since the turn of the century, Cetti's Warbler has spread from its original Mediterranean range northwards through France and into Belgium, the Netherlands and England. Breeding was first proved in Norfolk in 1974.

Pallas's Warbler: North: Wells Oct. 24th/25th (DIMW *et al*).

East: Happisburgh trapped and ringed on Oct. 14th remaining until 16th (BMEU).

Firecrest: Spring: Wells March 10th, April 11th-14th and 2 May 4th-6th. Winterton April 11th. Cley April 18th and Salthouse Heath May 24th.

Summer: Wells pair June 23rd, July 16th and 20th on which date the male was in song.

Autumn: Wells Sept. 28th, up to 3 between Oct. 13th and 20th, Nov. 2nd/4th and 24th. Yarmouth 2 Oct. 3rd. Cley Oct. 16th and Holme Oct. 19th, 26th-29th and 31st.

Spotted Flycatcher: An interesting record concerns 2 on board a vessel entering The Wash in foggy weather Aug. 30th. Three Oct. records: at Wells on 8th, Yarmouth on 10th and Happisburgh on 12th.

Pied Flycatcher: Spring: Holkham April 28th, May 8th and 11th/12th. Norwich May 1st.

Autumn: Late birds in Oct. at Yarmouth on 6th and at Wells on 20th.

Red-breasted Flycatcher: North: Cley Oct. 1st/2nd and 13th. Wells Oct. 7th, 12th/13th. East: Yarmouth Oct. 30th.

Richard's Pipit: North: Cley/Salthouse Oct. 5th, 15th, 24th and 26th (dead on beach). Sheringham Oct. 19th. Wells Oct. 19th and 24th.

Tawny Pipit: East: Winterton one south with Meadow Pipits Sept. 15th (PRA).

Water Pipit: The recent trend of an increase in the number of reports continues with records from 10 localities: Halvergate Jan. 27th, Fleggburgh March 3rd; Cley March 6th, April 12th/13th, Sheringham March 12th, Snettisham March 12th, Burgh Castle March 14th and 20th; Weybourne March 16th and Nov. 1st, Wisbech S.F. March 17th-20th Colney G.P. March 25th/26th and Winterton April 21st and Nov. 10th.

Pied Wagtail: Wash: Dersingham up to 60 roosting in bracken in winter and early spring.

Grey Wagtail: Bred successfully at eight localities: Bawburgh, Bawsey, Ellingham Mill, Lenwade, Marlingford Mill, Norwich (along river Wensum in city centre), Taverham Mill and Watermill Farm Northwold. Passage/wintering birds noted at 20 localities.

Blue-headed Wagtail: North: Weybourne male April 20th.

Grey-headed Wagtail: Central: Colney G.P. male May 14th (RPM).

Waxwing: In the early part of the year 6 at Yarmouth March 9th was the only report. An irruption began Oct. 4th, with the main arrival during the last week of October and peak counts between then and the first week of Nov. Monthly totals were as follows: October 290; November 502; December 54.

Largest flocks at Heacham Oct. 30th (50) Holme 31st (100), Walpole St. Andrew Nov. 1st/2nd (100) and West Lynn 8th (50).

During the final quarter of the year recorded at Acle, Alderfen, Blakeney, Brancaster Staithe, Brundall, Cley, Corpusty, Costessey, Cringleford, Earlham, Eaton, Felthorpe, Gooderstone, Gorleston, Heacham, Hethersett, Holme, Honingham, Hunstanton, King's Lynn, Martham, Melton Constable, North Walsham, Norwich, Potter Heigham, Rockland Broad, Snettisham, Sheringham, Spixworth, Strumpshaw, Surlingham, Stow Bedon, Taverham, Thornham, Thorpe St. Andrew, Titchwell, Walpole St. Andrew, Walsoken, Wells, West Lynn, Weybourne, Wiveton and Yarmouth.

Great Grey Shrike: Recorded up to April 11th and from Oct. 2nd. All reports concerned singles, apart from 4 in the Winterton-Horsey area Nov. 3rd. One was shot in mistake for a Jay at Crostwick.

Recorded at Beeston Common, Blakeney Point, Brancaster, Brandon, Brettenham Heath, Bridgham Heath, Buckenham, Buxton Heath, Cley, Colney, Costessey, Cromer, Crostwick, Dersingham, Didlington, Earlham, East Runton, East Wretham, Felthorpe, Fowl Mere, Holkham, Holme, Horning Hall, Horsey, How Hill, Ickburgh, Irstead, Kettlestone, Langford, Lang Mere, Narborough, Potter Heigham, Ranworth, Redgrave Fen, Reedham, Ridlington, Rockland Broad, Roydon Common, Ring Mere, Saddlebow, Sandringham, Salthouse, Santon Downham, Sheringham, Snettisham, Sparham, St. Helen's Well, Stanford, Sturston, Surlingham, Swanton Morley G.P., Thetford, Thurne, Titchwell, Two Mile Bottom, Warham, Wayford Bridge, Waxham, Wells, West Runton, Weybourne, Winterton, Wootton and Yarmouth.

Red-backed Shrike: Breeding season: Decline continues with only 7 definite pairs reported in the county. In addition singles during the summer at three North coast sites.
Autumn migrants at Sheringham Aug. 11th and Sept. 29th, Blakeney Point Aug. 30th/31st (2), Honing Common Aug. 31st, Holme Sept. 2nd-18th, Cromer Sept. 17th and Weybourne on 22nd.

Hawfinch: Apart from 20 at East Wretham in Nov., up to 5 at Attlebridge, Cley, Colney, Earlham Park, Fowl Mere, Fring, Santon Downham, Shadwell and Stanford.

Siskin: North: A pair nested at Holkham although the outcome is unknown. Largest parties recorded were 30 at Earlham Feb. 2nd and 50 at Wells Sept. 12th, while "large numbers" were present at Santon Downham in early spring. Party of 9 feeding on peanuts in a Norwich garden April 1st-7th is noteworthy.

Twite: Coastal counts include up to 1,000 at Titchwell in Jan. and 100 at Breydon in Jan. and Nov.

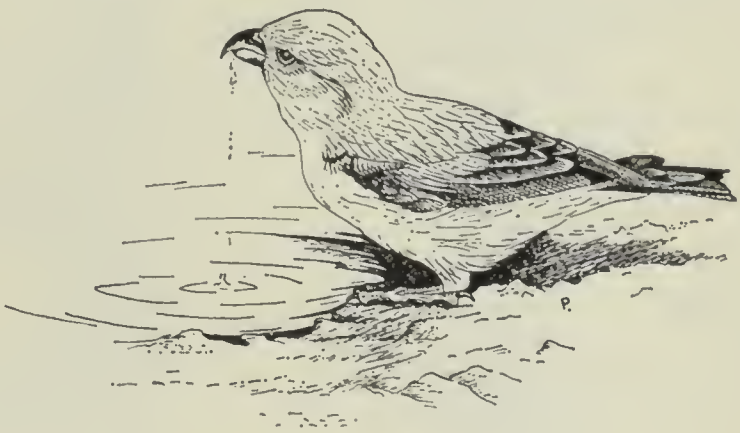
Scarlet Rosefinch: North: Cley male singing in Walsey Hills May 26th (DBR, RET), and what was probably the same bird at Sheringham the following day (JM, KBS). The third county record of this vagrant from Eastern Europe.

Crossbill: North: Wells/Holkham 1-2 pairs bred.
Brecks: Maximum count at Santon Warren where 15 Feb. 20th.

Brambling: Extreme dates May 6th and Sept. 10th.
Maximum counts of 500 at Warham Jan. 10th, 1,000 at Bodney Feb. 21st, 200 at Burgh Castle March 13th/14th, 350 at Lynn Point March 19th, 300 at Sheringham March 26th and 400 at St. Helen's Well April 21st.

Lapland Bunting: North: Recorded up to March 9th and from Sept. 29th at Cley/Salthouse (10), Holkham/Wells (11), Titchwell (3), Blakeney (3), Morston (4) and Holme (2).
East: Noted up to April 7th and from Nov. 6th at Halvergate (3) and Winterton (2).

Snow Bunting: Coastal reports up to April 21st and in latter quarter of year with latest birds at Runham Vauxhall April 15th and at Winterton on 21st.
Winter maxima include Brancaster 200, Breydon 36, Cley/Salthouse 250 and 310, Holme 250, Titchwell 170 and Winterton 61. Inland recorded at Buckenham (33 south-west Jan. 1st), Downham Market (female Oct. 30th) and Wisbech S.F. (Nov. 2nd).



The following, not mentioned in the Classified Notes, were also recorded in 1974 (*breeding species in italics*): Black-throated Diver, Great Northern Diver, Red-throated Diver, *Mallard*, *Teal*, *Canada Goose*, *Mute Swan*, *Kestrel*, *Red-legged Partridge*, *Partridge*, *Pheasant*, *Water-Rail*, *Moorhen*, *Coot*, *Lapwing*, Golden Plover, *Woodcock*, Knot, Great Black-backed Gull, Lesser Black-backed Gull, *Black-headed Gull*, Razorbill, *Stock Dove*, *Woodpigeon*, *Cuckoo*, *Tawny Owl*, *Green Woodpecker*, *Great Spotted Woodpecker*, *Skylark*, *Sand Martin*, *Jackdaw*, *Magpie*, *Great Tit*, *Blue Tit*, *Coal Tit*, *Marsh Tit*, *Willow Tit*, *Nuthatch*, *Treecreeper*, *Wren*, *Mistle Thrush*, *Song Thrush*, *Blackbird*, *Robin*, *Grasshopper Warbler*, *Reed Warbler*, *Sedge Warbler*, *Whitethroat*, *Goldcrest*, *Dunnock*, *Meadow Pipit*, *Tree Pipit*, Rock Pipit, White Wagtail, *Yellow Wagtail*, *Starling*, *Greenfinch*, *Goldfinch*, *Linnet*, *Redpoll*, *Bullfinch*, *Chaffinch*, *Corn Bunting*, *Yellowhammer*, *Reed Bunting*, *House Sparrow* and *Tree Sparrow*.

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Norfolk Naturalists Trust Properties

Date Acquired		Acreage		Status*
	On the Coast			
1926	Cley Marshes	435	Gift	S.S.S.I.†
1937	Duchess's Pightle, Burnham Overy ..	1	Gift	——
1937	Great and Little Eye, Salthouse ..	10	Purchased	S.S.S.I.
1945	East End of Scolt Island	76	Purchased	N.N.R.
1955	The Eye, Salthouse	21	Purchased	S.S.S.I.
1965	Holme	400	Purchased, Gift & Agreement	S.S.S.I.
1971	Salthouse Marshes	200	Agreement	S.S.S.I.
	Broadland			
1928 and 1974	Starch Grass (Martham)	43½	Purchased & Gift	S.S.S.I.
1930	Alderfen Broad	72	Purchased	S.S.S.I.
1945 and 1969	Hickling Broad	816	Purchased	N.N.R.
1945	„ „	500	Leased	N.N.R.
1945	Barton Broad	355	Half Gift &	S.S.S.I.
1952	„ „		Half Purchased	S.S.S.I.
1948	Surlingham Broad	253	Purchased	S.S.S.I.
1949	Ranworth Broad	124	Gift	N.N.R.
1949	Cockshoot Broad	12	Gift	N.N.R.
1964	Firs Marsh, Burgh St. Peter	2½	Leased	——
1971	Martham Broad	103	Leased	S.S.S.I.
1972	Hardley Flood	90	Leased	——
1972	Chedgrave Common	10	Leased	——
1974	Barton Marshes..	10¼	Gift	——
	Breckland			
1938	East Wretham Heath	362	Purchased & Gift	S.S.S.I.
1942	Weeting Heath	343	Gift	N.N.R.
1949	Thetford Heath	250	Gift	N.N.R.
	Other Areas			
1957	Thursford Woods	25	Gift	——
1960	Hethel Old Thorn	⅛	Gift	——
1961	Scarning Fen	10½	Gift	S.S.S.I.
1962	Hockham Fen (Cranberry Rough) ..	20	Purchased	S.S.S.I.
1963	Roydon Common	140	Purchased	S.S.S.I.
1966	Stoke Ferry Fen	25	Agreement	S.S.S.I.
1968	Lenwade Water	37	Agreement	——
1968	Dickleburgh Pightle	1	Agreement	——
1972	Smallburgh Fen..	19	Leased	S.S.S.I.
1972	Ringstead Downs	26	Agreement	S.S.S.I.

(continued on page 224)

1973	East Winch Common	80	Gift	S.S.S.I.
1974	Sparham Pools	30	Agreement	——
1974	Buxton Heath	159	Agreement	S.S.S.I.
1975	Popes Drift	8	Agreement	——
1975	Wayland Wood	80	Purchase	S.S.S.I.

In addition, the Trust shares with the National Trust in the management of the coastal reserve at Blakeney Point (1,335 acres), and it manages Arnold's Marsh, Cley (29 acres) on behalf of the National Trust.

By agreement with the Nature Conservancy Council, Scolt Head Island, Ranworth Broad, Hickling Broad, and the Breckland Heaths now form part of the National Nature Reserves.

*Status: N.N.R. denotes National Nature Reserve
S.S.S.I. ,, Site of Special Scientific Interest

†In 1966 Cley Reserve was established as a Bird Sanctuary under the Protection of Birds Act, 1954.

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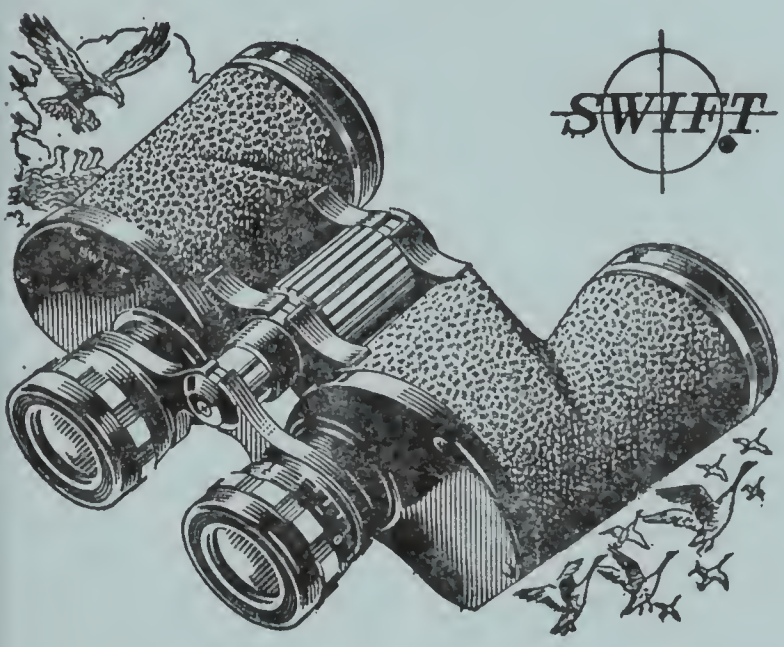

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MAJOR H. W. FIELDEN, C.B., F.G.S., C.M.Z.S.	1885-86
SIR PETER EADE, M.D., F.R.C.P.	1886-87
SIR EDWARD NEWTON, K.C.M.G., F.L.S., C.M.Z.S.	1887-88
J. H. GURNEY, F.L.S., F.Z.S.	1888-89
SHEPHERD T. TAYLOR, M.B.	1889-90
HENRY SEEBOHM, F.L.S., F.Z.S.	1890-91
F. D. WHEELER, M.A., LL.D.	1891-92
HORACE B. WOODWARD, F.G.S.	1892-93
THOMAS SOUTHWELL, F.Z.S.	1893-94
C. B. PLOWRIGHT, M.D.	1894-95
H. D. GELDART	1895-96
SIR F. C. M. BOILEAU, Bart., F.Z.S., F.S.A.	1896-97
E. W. PRESTON, F.R.Met.Soc.	1897-98
J. H. GURNEY, F.L.S., F.Z.S.	1898-99
JOHN T. HOTBLACK	1899-1900
SIDNEY F. HARMER, Sc.D., F.R.S.	1900-01
W. H. BIDWELL	1901-02
HENRY WOODWARD, LL.D., F.R.S., V.P.Z.S., F.G.S.	1902-03
FREDERICK LONG, L.R.C.P.	1903-04
WALTER GARSTANG, M.A.	1904-05
EUSTACE GURNEY, M.A., F.Z.S.	1905-06
C. A. HAMOND	1906-07
SYDNEY H. LONG, M.D., M.B.O.U.	1907-08
REV. M. C. H. BIRD, M.A., M.B.O.U.	1908-09
D. G. THOMSON, M.D.	1909-10
W. M. CROWFOOT, F.R.C.S.	1910-11
W. LINCOLNE SUTTON, F.I.C.	1911-12
ROBERT GURNEY, M.A., F.Z.S.	1912-13
MISS ALICE M. GELDART	1913-14
J. H. F. WALTER, F.Z.S.	1914-15
H. J. THOULESS	1915-16
CLAUDE B. TICEHURST. M.A., M.B.O.U.	1916-17
W. G. CLARKE, F.G.S.	1917-18
EDWARD BIDWELL	1918-19
J. H. GURNEY, F. L. S., F.Z.S.	1919-20
B. B. RIVIERE, F.R.C.S., M.B.O.U.	1920-21
MISS E. L. TURNER, F.L.S., F.Z.S.	1921-22
RUSSELL J. COLMAN	1922-23
SIR HUGH R. BEEVOR, Bart.	1923-24
DONALD HUTCHINSON, M.D.	1924-25
E. H. HANKIN, M.A., Sc.D.	1925-26
E. H. HANKIN, M.A., Sc.D.	1926-27
H. J. HOWARD, F.L.S.	1927-28
H. F. WITHERBY, F.Z.S., M.B.O.U.	1928-29
G. H. GURNEY, F.E.S., F.Z.S., M.B.O.U	1929-30
MISS A. M. GELDART	1930-31
E. J. SALISBURY, D.Sc., F.L.S.	1931-32
MAJOR A. BUXTON, D.S.O., M.B.O.U.	1932-33
MAJOR A. BUXTON, D.S.O., M.B.O.U.	1933-34
W. P. PYCRAFT, F.L.S., F.Z.S.	1934-45
COLIN McLEAN	1935-36
G. J. COOKE	1936-37
MISS J. M. FERRIER, F.Z.S., M.B.O.U.	1937-38
E. T. BOARDMAN	1938-39
HUGH WORMALD, M.B.O.U.	1939-40
J. A. STEERS, M.A.	1940-41
E. C. KEITH	1941-42
A. J. RUDD, O.B.E., F.Z.S.	1942-43
MISS C. E. GAY	1943-44
SIR H. E. S. UPCHER	1944-45
H. W. BACK	1945-46
R. G. BUXTON	1946-47
THE EARL OF LEICESTER	1947-48
R. PEARCE GOULD	1948-49
JAMES FISHER	1949-50
J. E. SAINTY, B.Sc.	1950-51
DR. J. M. LAMBERT, M.A., F.L.S.	1951-52
R. P. BAGNALL-OAKELEY	1952-53
E. A. ELLIS, F.L.S.	1953-54
E. A. ELLIS, F.L.S.	1954-55
R. JONES	1955-56
E. L. SWANN, F.L.S.	1956-57
E. DUFFEY, O.B.E., Ph.D.	1957-58
F. J. TAYLOR-PAGE	1958-59
L. C. JOHNSON	1959-60
K. C. DURRANT, F.R.E.S., J.P.	1960-61
J. M. LAMBERT, M.A., Ph.D., F.L.S.	1961-62
M. J. SEAGO	1962-63
JOHN BUXTON	1963-64
MissRUTH M. BARNES,A.M.A., F.L.S.	1964-65
T. A. BENNET-CLARK C.B.E., F.R.S.	1965-66
B. FORMAN, Ph.D.	1966-67
R. P. BAGNALL-OAKELEY	1967:68
E A. ELLIS, F.L.S.	1968-69
MISS ETHEL M. BUTTERY, B.Sc.	1969-70
P. A. BANHAM, B.A.	1970-71
J. A. KITCHING, O.B.E., F.R.S.	1971-72
K. B. CLARKE, B.Sc., F.G.S.	1972-73
Miss CATHERINE GURNEY	1973-74
A. BULL	1974-75
EARL OF CRANBROOK, C.B.E., F.L.S.	1975-76
M. GEORGE, Ph.D.	1976-

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AN ECOLOGICAL REVIEW OF THE YARE VALLEY NEAR NORWICH

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R. Hornby, Nature Conservancy Council,
P. W. Lambley and J. Ismay, Natural History Dept., Castle Museum, Norwich.

Introduction

The streams and rivers of East Anglia—taken with their marginal reed-swamp, fen, marsh and meadow—constitute an important series of habitats in the mosaic of Britain's natural history. As with other natural and semi-natural habitats, these areas are subject to the increasing use and abuse that follows upon the increasing population density of the region, but the threat is at its keenest in the vicinity of growing towns and cities. The River Yare, in passing from its catchment areas in central Norfolk to the sea at Yarmouth, skirts the city of Norwich on its south-western, southern and south-eastern sides. The expansion of the city has, during the last few decades, spilled down the slopes of the river valley in the form of large estates at Earlham, Eaton and Lakenham, and the next decade will see a further massive development at Bowthorpe. Not only have these and other local developments directly obliterated large areas in the valley system, but they have increased the numbers of people in the city that look to the river and its periphery to provide amusement and relaxation.

Within the last few years a number of voices have been raised in favour of realising the recreational potential of the Yare Valley near Norwich, in particular the detailed proposals published by the Norwich Society River Group in 1969 under the title of 'A Journey Along the Waterways of Norwich'. While some of the proposals, such as the suggested system of riverside pathways, seemed unexceptionable, there was some disquiet about the impact of the new 'country parks' and their associated car parks upon the wild life of the area. There was too little information about the relative ecological significance of different valley areas to enable responsible initiatives to be made or informed planning decisions to be implemented. As a result of representations made by the Norfolk and Norwich Naturalists Society to the Norwich Society, a joint meeting of representatives was held on November 23, 1970, and as a result the Naturalists offered to survey the areas particularly concerned with a view to advising the planning authority as to their relative conservation value.

The Society Sub-Committee elected to the task of conducting the survey was concerned to gather as much biological information as possible to enable a balanced view of the whole area to be obtained, and to permit the identification of sites particularly suited to research, educational or amenity ends. The Sub-Committee arranged for a number of Yare Valley sites to be included in the excursion schedules for the 1971, 1972 and 1973 seasons, as well as issuing a general appeal to Society members for any other helpful and relevant information. It was apparent, however, that any review of such an extensive area must include a comprehensive survey of a kind that would result not only in a cataloguing of the range of habitats available but also an assessment of the conserva-

tion value of each habitat in relation to others of its class. It was important that such a survey should be carried out by a small group of people visiting all parts of the area and judging each site by an agreed set of criteria. Given such information it should be possible to classify the habitats, identify uncommon or ecologically significant sites that stand in need of protection, and grade the remaining habitats in each class so as to make informed recommendations about their use.

Methods

In planning the survey, it was considered that the areas at greatest risk were those parts of the Yare Valley in closest proximity to Norwich. Accordingly, it was arranged to include in the survey the land immediately adjacent to the river in a band extending from Bawburgh Mill in the west, downstream to Whitlingham Marshes in the east. The total survey area was initially divided into 33 roughly equivalent sections, each consisting of about one kilometre of river bank in length and about 200-400 metres of valley floor and slopes on one side of the river in width, the sections being numbered and named to facilitate identification and description. During the survey it became evident that the natural compartmentation sometimes required reshaping or subdivision of the initial, rather arbitrary, units, and the number of sections surveyed finally numbered 46 (*see Maps*).

The owners of virtually all of the land to be surveyed were identified by general or by local enquiries. Landowners were approached by letter and in the majority of cases permission to visit the sites and make the study was ungrudgingly given. Fieldwork commenced at Easter and continued through the summer of 1974 at roughly fortnightly intervals as follows: April 9th, 22nd; May 9th, 21st; June 11th, 24th; July 22nd; August 2nd, 16th, 30th; September 17th. During each afternoon's field work three or four sections were covered, assessed and recorded. In general the sections were visited in sequence downstream, and some possibility of bias might arise from different sections being visited in different seasons, but it was not felt that this posed serious problems. Additional data was derived from extra visits made to particular sections by individual members of the team; from the excursions to the area arranged by the Society; from individuals responding to a general request published in the Society's Bulletin; and from Nature Conservancy Council and Castle Museum records.

Since one of the chief aims of the survey was to arrive at a comparative view of the significance of the many habitats in the river valley, it was important to convert an essentially subjective exercise into as objective a study as possible. Considerable thought and discussion was given to the framing of a set of criteria by which each section could be judged, and the following eleven-point scale was adopted:

Presence of scarce species	10
Diversity of species	10
Presence of scarce habitats	5
Diversity of habitats	10
Quality of higher plants	20
Quality of lower plants	5

Quality of vertebrates	15
Quality of invertebrates	10
Value for research	5
Value for education..	5
Value for amenity	5
	100

While the scale of assessment was, for the most part, subjective, there was a substantial measure of agreement as to the manner in which points were to be awarded in each section.

(a) PRESENCE OF SCARCE SPECIES: Since one of the resources of the natural world is its diversity of plant and animal species, the preservation and protection of threatened species is an important component of any planning review. In the present survey the assessment has two levels of significance: species that may be nationally rare (although they could be common in the valley area) qualify for a high rating in respect of a natural resource held in trust for the country as a whole; species that are scarce within the valley system qualify for recognition in respect of the need to conserve a range of living forms for local research, education and amenity purposes.

(b) DIVERSITY OF SPECIES: An estimate of the total number of plant and animal species should provide some measure of the richness of the ecosystem. Since newly colonised areas and 'improved' areas (e.g. cultivated, reseeded and sprayed grazing pastures) are notably poorer in range of species than well-established communities, this may also be considered an index of the age, status and possibly also stability of the community.

(c) PRESENCE OF SCARCE HABITATS: The valley contains no habitats that are nationally rare, so this component of the assessment seeks to identify and credit habitats that are scarce within the valley system, and so help to sustain the greatest range of habitats within the valley as a whole.

(d) DIVERSITY OF HABITATS: Areas that include a greater range or diversity of different habitats within a limited area, and so provide a mixture of opportunities for plant and animal life, are likely to be recognised as more interesting and attractive for educational and amenity purposes. A minor source of error in this part of the scoring arises from the tendency to subdivide major areas for assessment so that diversity is not always measured within areas of comparable size.

(e) QUALITY OF HIGHER PLANTS: While scarce plants will have been credited in (a), and the range of plant species will partly account for the score in (b), there remains a less easily defined quality of interest that merits assessment. Although not rare, some plants may be botanically significant, may be 'striking' in some respect, or occur in such numbers or arrangements as to excite comment, or offer some other such special appeal.

(f) QUALITY OF LOWER PLANTS: Applying the same considerations as in (e), with the reservation that the distribution of visits through the year made difficult the assessment of fungi.

(g) QUALITY OF VERTEBRATES: Applying the same consideration as in (e). No trapping was attempted so judgement in this section depended upon chance encounters (birds, amphibia) or upon tracks or signs (mammals).

(h) QUALITY OF INVERTEBRATES: Applying the same considerations as in (c). While the insect populations were systematically sampled, little other information was available.

(i) VALUE FOR RESEARCH: Given the extent of individual work carried out by the students and staff in higher and further education in the area, together with investigations mounted by amateur naturalists, particular value was felt to attach to areas having reasonable access but suffering limited public pressures, were reasonably close to university or college and offered good opportunities for investigative fieldwork.

(j) VALUE FOR EDUCATION: Considering the popularity of the river and its environs with children, and the increasing need to facilitate environmental approaches to education, some credit was afforded sites that were accessible to school parties and thought likely to be biologically productive without being unduly hazardous.

(k) VALUE FOR AMENITY: Scoring for amenity recognised areas of natural charm and beauty; or areas that were, or could be made, accessible for walking, angling, etc.; or areas of lesser value that might be given over to the more disruptive outdoor pleasures and amusements of the local population; or, simply, sites that would profit by being maintained as open space rather than developed.

It will be noted that there are criteria of two kinds in the above set—the first eight (a to h) concerned only with an assessment of the wild life content of each section, and the last three (i to k) concerned with an assessment of the potential of the section for dedication to a particular use. The team arbitrarily decided that these latter factors should each count for 5% of the total score for each section. These weightings are clearly personal views, and readers may derive a wildlife value for each section by subtracting the last three scores from the whole.

Since the time available did not permit a pilot survey of the area, it was necessary to apply the assessment procedures without knowing the range of scores likely to be encountered in the valley as a whole. Perhaps understandably, there was a tendency in the early work to underestimate, and so underscore, the sites considered, and subsequently, comparability had to be sustained with the result that all scoring tended to be in the lower part of the scale and no site scored more than 34 points out of 100. This raw data was scaled upwards at the close of the survey by converting the top score in each of the eleven categories into the maximum possible score and increasing the other results in that category proportionally but to the nearest whole number. The scaled category figures for each site were then totalled, and these figures were used for the grading of the sites. The distribution of grades was as follows:

Grade 1 Sections	Score 65-100%	4 sites
Grade 2 Sections	Score 55-64%	4 sites
Grade 3 Sections	Score 45-54%	5 sites
Grade 4 Sections	Score 35-44%	9 sites
Grade 5 Sections	Score 25-34%	17 sites
Grade 6 Sections	Score 0-24%	7 sites

While the estimation of several, often conflicting, properties is subsumed within a single grade, in general it might be said that Grade 1 sites are considered to be highly desirable areas of multiple ecological values, and that Grade 2 sites have much to commend them in several respects.

SECTION 1—BAWBURGH VILLAGE: Area of grazed pasture on S. side of river, and mown grassland on N. side of river, above and below the road bridge. Grade 5, chiefly of value as open space within the village.

SECTION 2—BAWBURGH EAST: Area of grazed pasture on S. side of river, but including backwater with marginal and marsh vegetation, and large area of blackthorn scrub. Grade 2, particularly for the quality of the higher plants and the insects of the blackthorn (including *Myopa strandi* (Diptera; Conopidae)).

SECTION 3—BAWBURGH WINDPUMP: Area of ley, arable (barley in 1974), and rough damp grassland dominated by *Juncus spp.* and *Deschampsia caespitosa.* Grade 5.

SECTION 4—CLINK HILL WEST: Area of 'improved' pasture on N.E. side of river. Grade 6.

SECTION 5—CLINK HILL EAST: Area of gravel workings, flooded gravel pit, gravel banks and riverside stretch of 'improved' grassland. Grade 3, particularly because of birds seen (great crested grebe, pochard, tufted duck, kingfisher) or reported (sparrowhawk), and range of invertebrates, especially butterflies.

SECTION 6—COLNEY WOOD: Area of young mixed plantation—pine, birch, sweet chestnut, sycamore, elm, etc. Grade 2, particularly because of quality of higher plants including some rare *Rubi*, *Trifolium striatum*, *Carex pairaei*, *Verbascum pulverulentum.*

SECTION 7—COLNEY WOOD MARSHES: Area of rough grazed pasture lying between wood and river. Grade 5.

SECTION 8—BAWBURGH LODGE MARSHES: Riverside grassland, part 'improved' and monotonous and part grazed but rough. Some small recolonised gravel workings. Grade 5.

SECTION 9—COLNEY GRAVEL PITS: Area of current and abandoned gravel workings S. of the river: flooded and very disturbed. Grade 1 as an area showing great diversity of species, including uncommon (*Rumex maritimus*, Water Rail) and attractive (Green Sandpipers, Sedge Warblers) kinds.

SECTION 10—COLNEY PINE PLANTATION: The only conifer plantation in the study area. Encloses rough grassland clearings. *Potentilla recta*, *Carex echinata*, but Grade 5.

SECTION 11—BOWTHORPE WEST: Riverside strip of rough grazed pasture with patches of *Glyceria maxima. Verbascum pulverulentum* found and Kestrel seen, but Grade 5.

SECTION 12—COLNEY HALL FARM MEADOWS: Strip of 'improved' grazed pasture with narrow fringe of *Glyceria maxima* along river edge. Grade 6.

SECTION 13—COLNEY CHURCH EAST: Fields between Colney Church and Hill Farm, S. of river. Part rough grass and part planted with poplars. Range of higher plants (including *Saxifraga granulata*), lower plants (especially *Parmelia caperata*) and some birds (especially Kingfisher). Grade 3.

SECTION 14—BOWTHORPE EAST: Strip of rough grassland bordering river with willow scrub at E. end. Grade 5.

SECTION 15—COLNEY TO EARLHAM MEADOWS: Large area of grazed rough pasture bounded by the curving river to the N. and the Earlham Road to the S. Some diversity with *Deschampsia caespitosa* tussocks, winding ditches dominated by *Glyceria maxima* with *Phalaris arundinacea* and *Carex riparia*, and hedges. Apparently unimproved and supporting a good association of marsh species. Grade 2.

SECTION 16—EARLHAM WEST: Area of rough, horse-grazed marsh between housing estate and river, with copse of sycamore, ash, willow, and a fringe of willow between marsh and estate. Varied marsh flora—*Thalictrum*, *Valeriana*, *Caltha*—but vulnerable to estate. Two scarce flies—*Lonchoptera scutellata* and *Elachiptera uniseta*—but Grade 4.

SECTION 17—INSTITUTE MARSHES: Area W. of river, downstream of Earlham Bridge, adjacent to Food Research Institute. Diverse area of ungrazed marsh, ungrazed pasture, willow copse, gorse/bramble and disturbed ground. Grade 4.

SECTION 18—EARLHAM PARK: Mown grass and river margin. High amenity value but Grade 6.

SECTION 19—EARLHAM HALL WOODS: Mixed deciduous woodland and overgrown pond. An attractive stretch scoring in most sections—diverse and interesting plants, including *Corydalis claviculata*, birds (e.g. Garden Warbler, Green Woodpecker) and invertebrates in an area having value for research, education and amenity. Grade 1.

SECTION 20—UNIVERSITY PLAYING FIELD: Mown grassland; river margin partly mown and planted with poplars. Grade 6.

SECTION 21—UNIVERSITY MARSHES: One of the few areas dominated by coarse marsh vegetation, especially *Glyceria maxima*, *Filipendula ulmaria*, *Epilobium hirsutum*, *Urtica dioica*. Grade 4.

SECTION 22—UNIVERSITY BROADS. Excavations in progress: open water and 'beach'. Potential rather than present interest. Grade 4.

SECTION 23—CRINGLEFORD WOOD: Mixed woodland on dry slope S. of river—ash, sycamore, lime, hazel, pine, oak. Grade 6.

SECTION 24—CRINGLEFORD MARSHES: Ungrazed or lightly grazed marsh dominated by *Phalaris*, *Glyceria*, *Filipendula*, *Carex riparia* and including *Thalictrum*, *Scutellaria*, *Hottonia*. Grade 5.

SECTION 25—CRINGLEFORD CARR: Very attractive area of alder carr with typical vegetation and some surprising additions—*Aconitum napellus*, *Leucojum aestivum*, *L. vernum*. Grade 1.

SECTION 26—BLUEBELL MARSHES: Area of dry grassland extending from Bluebell Road down to marsh and extensive reed bed fringing river. Only reed bed in the survey area, and a useful swallow roost. Good range of higher plants and amphibians. Grade 2.

SECTION 27—CRINGLEFORD MILL: Attractive area in close proximity to Mill, otherwise extensive roadworks for by-pass and suburban gardens. Grade 5.

SECTION 28—EATON NURSERY MARSHES: Rough ungrazed marshland lying between derelict nurseries on Bluebell Road and river. Extensive areas of *Glyceria maxima*, *Epilobium hirsutum*, *Carex acutiformis*, *Filipendula ulmaria*, *Urtica dioica*, etc. Useful, especially for nesting waterfowl. Sallow and alder may need controlling. Grade 4.

SECTION 29—CRINGLEFORD LOKE MARSHES: Area including horse-grazed *Ranunculus/Bellis/Rhinanthus* pasture; *Glyceria/Juncus/Carex acutiformis* marsh; and Hawthorn/Willow trees and hedges. Grade 5.

SECTION 30—EATON SOUTH: Eaton churchyard, a range of suburban gardens and an extensive island of ungrazed marshland. The relative inaccessibility of the island is a useful feature. Grade 4.

SECTION 31—KESWICK MARSHES: Cattle-grazed marshes and dykes between Keswick Village and the river. Some strips of trees and a poplar plantation. Good range of marginal plant species. Grade 4.

SECTION 32—EATON COMMON AND KESWICK MILL: Mill fields of 'improved' grassland; Common of rough grassland with *Epilobium hirsutum;* and a patch of willow/alder carr with riverside marsh fringe. Good aquatics, especially *Nymphoides peltata*, *Potamogeton praelongus*. Grade 4.

SECTION 33—KESWICK MILL TO HARFORD MARSHES: Area of cattle-grazed marsh between river and railway, including dykes with *Glyceria* and a small area of carr. Grade 5.

SECTION 34—MARSTON MARSHES: Area of cattle-grazed rough marsh between Marston Lane and river. Liable to winter flooding. Numerous open drains with good range of plant species, including *Butonus umbellatus*, *Scroplularia umbrosa*. Grade 3.

SECTION 35—HARFORD HILLS: Small area bounded by river, railway and Ipswich Road. Horse-grazed field and ungrazed area of *Glyceria/Epilobium hirsutum*. Grade 5.

SECTION 36—MARKSHALL MARSH: Area of rough marsh S. of river and downstream of Harford Bridge. *Glyceria/Epilobium/Urtica/Filipendula*, etc. Grade 5.

SECTION 37—HARFORD TIP: Rubbish tip, particularly interesting because of alien plants not established in the native flora, and some unusual invertebrates such as house crickets. Grade 3.

SECTION 38—TAS VALLEY SOUTH: Area of rather monotonous 'improved' grazing pasture with some interesting drainage dykes. Grade 5.

SECTION 39—OLD RIVER: Section of river isolated in viaduct construction, of high plant interest—*Nymphaea alba*, *Butomus umbellatus*, *Hydrocharis morsus-ranae*, *Chara spp.*, *Potamogeton spp.*—and good invertebrates, *Aeschna grandis* common, *Tetrix subulata*. Also area of willow scrub and section of new river. Grade 1.

SECTION 40—TAS VALLEY NORTH: Rough ungrazed marsh isolated between railway and river: *Phragmites/Glyceria/Urtica/Epilobium* with *Salix* scrub. Grade 5.

SECTION 41—OLD LAKENHAM: Rough ungrazed marsh between housing estate and river: *Glyceria/Epilobium/Urtica/Phragmites* with *Salix* scrub. Grade 5.

SECTION 42—TROWSE MILL: Areas of mown grass, CEGB station, arable and rough pasture. Grade 5.

SECTION 43—TROWSE MARSHES: Areas downstream of Trowse Bridge and N. of river. Marsh of distinct areas dominated severally by *Epilobium hirsutum*, *Angelica sylvestris*, *Carex acutiformis*, *Polygonum amphibium*. Also dumped soil with arable weeds, and a stand of polars. Grade 3.

SECTION 44—WHITLINGHAM LANE: Grazed pasture between Whitlingham Lane and river and from Trowse Bridge downstream to confluence. 'Improved' and dull. Grade 6.

SECTION 45—WHITLINGHAM MARSHES: Grazed pasture between Whitlingham Lane and river from confluence downstream to plantation. Pasture dull but dykes more interesting. Also some alder scrub. Grade 4.

SECTION 46—ROUGH MARSH PLANTATION: Plantation of willows. Neat but rather uninteresting. Grade 6.

TABLE 1

Showing scaled score ratings for each section

SECTION NUMBER	a (10)	b (10)	c (5)	d (10)	e (20)	f (5)	g (15)	h (10)	i (5)	j (5)	k (5)	TOTAL (100)
1	0	3	0	7	2	0	5	4	0	0	5	26
2	3	7	2	10	12	0	10	10	2	2	2	60
3	0	5	0	7	4	0	7	6	0	0	1	30
4	0	3	0	3	2	0	7	2	0	0	1	18
5	10	5	2	7	6	0	12	8	2	0	2	54
6	6	6	2	10	14	3	7	8	2	0	1	59
7	0	3	0	7	6	2	5	4	0	0	1	28
8	0	3	0	7	6	0	7	6	2	0	1	32
9	7	10	2	7	14	2	15	6	2	0	0	65
10	3	3	2	7	6	0	5	4	0	0	1	31
11	0	3	0	7	4	0	7	4	0	2	1	28
12	0	3	0	3	4	0	5	4	0	0	0	19
13	3	5	0	10	8	5	10	6	0	2	1	50
14	0	3	2	7	6	0	2	4	0	0	2	26
15	3	7	2	10	8	0	10	8	2	5	4	59
16	3	5	2	10	6	0	2	6	0	0	4	38
17	0	5	2	10	10	0	7	4	0	2	1	41
18	0	2	0	3	2	3	2	2	0	2	5	21
19	3	8	0	7	12	2	15	8	5	5	4	69
20	0	3	0	7	4	0	5	2	0	2	1	24
21	0	5	2	3	4	2	10	4	2	2	1	35
22	0	3	2	7	4	0	5	2	5	5	5	38
23	0	2	2	3	4	0	5	4	0	0	2	22
24	0	3	0	3	12	0	7	4	2	2	1	34
25	10	10	5	3	16	2	10	6	5	2	1	70
26	3	7	5	10	12	0	7	6	2	3	4	59
27	0	5	0	10	6	0	7	4	0	0	1	33
28	0	5	0	10	10	0	7	4	2	2	2	42
29	0	5	0	7	8	2	5	4	0	0	1	32
30	0	5	2	7	6	5	5	4	2	2	0	38
31	0	5	2	10	8	0	7	4	0	2	1	39
32	3	3	0	10	8	2	7	4	0	2	3	42
33	0	3	0	7	8	0	5	6	0	0	1	30
34	7	5	0	7	10	0	7	6	0	3	1	46
35	0	3	0	10	6	0	7	4	2	0	1	33
36	0	5	0	3	6	0	5	6	2	2	1	30
37	7	8	2	3	14	0	5	8	2	2	0	51
38	0	5	0	7	6	0	7	4	0	2	1	32
39	7	7	2	7	20	2	10	8	2	0	0	65
40	0	3	0	10	6	2	7	4	0	0	1	33
41	0	3	0	10	4	3	7	4	0	0	2	33
42	0	3	0	10	6	0	7	4	0	2	1	33
43	0	7	5	10	8	0	10	6	0	0	1	47
44	0	3	0	3	4	0	5	4	0	2	1	22
45	0	5	2	7	4	0	10	4	0	2	1	35
46	0	3	2	3	2	2	5	2	2	0	1	22

TABLE 2

Showing scaled score and grade for each section

SECTION NUMBER	NAME	SCALED SCORE	GRADE
1	Bawburgh Village	26	5
2	Bawburgh East	60	2
3	Bawburgh Windpump	30	5
4	Clink Hill West	18	6
5	Clink Hill East	54	3
6	Colney Wood	59	2
7	Colney Wood Marshes	28	5
8	Bawburgh Lodge Marshes	32	5
9	Colney Gravel Pits	65	1
10	Colney Pine Plantation	31	5
11	Bowthorpe West	28	5
12	Colney Hall Farm Meadows	19	6
13	Colney Church East	50	3
14	Bowthorpe East	26	5
15	Hill Farm to Earlham Bridge	59	2
16	Earlham West	38	4
17	Institute Marshes	41	4
18	Earlham Park	21	6
19	Earlham Hall Woods	69	1
20	University Playing Field	24	6
21	University Marshes	35	4
22	University Broads	38	4
23	Cringleford Wood	22	6
24	Cringleford Marshes	34	5
25	Cringleford Carr	70	1
26	Bluebell Marshes	59	2
27	Cringleford Mill	33	5
28	Eaton Nursery Marshes	42	4
29	Cringleford Loke Marshes	32	5
30	Eaton South	38	4
31	Keswick Marshes	39	4
32	Eaton Common and Keswick Mill	42	4
33	Keswick Mill to Harford Marshes	30	5
34	Marston Marshes	46	3
35	Harford Hills	33	5
36	Markshall Marsh	30	5
37	Harford Tip	51	3
38	Tas Valley South	32	5
39	Old River	65	1
40	Tas Valley North	33	5
41	Old Lakenham	33	5
42	Trowse Mill	33	5
43	Trowse Marshes	47	3
44	Whitlingham Lane	22	6
45	Whitlingham Marshes	35	4
46	Rough Marsh Plantation	22	6

TABLE 3

Habitats in the area surveyed

SECTION	GRASSLAND			MARSH	SCRUB	WOODLAND			OPEN WATER	OTHER	
	MOWN	GRAZED	ROUGH			DEC.	CON.	MIX.		GRAVEL PIT	REFUSE TIP
1	★	★									
2		★		★	★						
3		★	★								
4		★									
5		★			★				★	★	
6								★			
7			★								
8		★								★	
9									★	★	
10			★				★				
11		★									
12		★									
13			★			★					
14			★		★						
15		★		★		★					
16		★			★	★					
17			★	★	★						
18	★										
19				★		★					
20	★										
21				★							
22									★		
23								★			
24				★							
25						★					
26			★	★							
27				★		★					
28				★							
29		★									
30				★							
31		★				★					
32		★	★		★						
33		★				★					
34		★									
35		★		★							
36			★								
37			★								★
38		★									
39					★				★		
40				★	★						
41				★	★						
42	★	★									
43				★							
44		★									
45		★			★	★					
46						★					
Total	4	20	10	14	10	10	1	2	4	3	1

The Habitats Classified

A limited number of different habitats is represented in the study area, and the distribution of these is shown in Table 3. In referring to the table it must be recognised that the habitats indicated are not mutually exclusive. The range of vegetation in the Valley represents a continuum in which the various habitat categories are artificial, although useful, divisions.

Grassland

The great majority of the survey area is dominated by grassland, although this varies widely in kind. Variation in management—cutting, grazing, use of fertilisers or herbicides—is responsible for many of the differences observed, although water supply and drainage represent another important controlling influence. Many of the sites considered contain more than one type of grassland habitat, and in some sections where levels are irregular the differential drainage results in a mosaic of vegetation types. Grazing and drainage often interact, with wetter areas tending to be grazed less than drier.

MOWN GRASSLAND: Areas regularly cut by machine to produce a turf for amenity purposes. This habitat is relatively scarce in the Valley, the largest areas being in the civic park at Earlham (18) and the playing fields of the University (20). The maintenance of grass species in a small and vegetative state, and the discouragement of other herbaceous species, leads to rather limited and monotonous plant communities whose chief value is for sports and recreation.

GRAZED GRASSLAND: A heterogeneous classification, ranging from heavily grazed areas approximating to mown grassland, through medium grazing permitting taller and more diverse vegetation, to light and/or intermittent grazing allowing ranker growth tending towards rough grassland. No sites in the survey area were currently being managed for hay, and in only one field (45) was cutting for silage observed. In the whole of its work the survey party was unable to find grazed meadows with a wide range of grasses and other herbs in a species-rich assemblage. This reduction in diversity of the vegetation seemed likely to result from the use of fertilisers to increase the productivity of the land for grazing and to favour the more exacting rye grasses and clovers. Much of the grazing land is probably regularly fertilised and contains a narrow range of species, but some is infrequently treated and contained herbaceous species such as *Lychnis flos-cuculi*, *Rhinanthus minor*, *Cardamine pratensis*, *Trifolium pratense*, *Plantago lanceolata*, *Filipendula ulmaria*, *Rumex acetosa*, etc. It is likely that the diversity of species has been further reduced in several areas by the use of selective herbicides. The application of fertilisers and herbicides tends to be on the drier areas, so providing another factor complicating the balance between vegetation, water level and grazing. Special mention in this category to Sections 15 and 34.

ROUGH GRASSLAND: Areas of irregular and rank vegetation, almost certainly grazed or cut in the past but now neglected, and often invaded by scrub. Some of these areas were high and quite dry (26), while others were lower and wetter, with tussocks of *Deschampsia caespitosa* or *Juncus spp.*, and blending into marsh (3, 17, 32). One or two of these areas were quite interesting, e.g. 17 with *Saxifraga granulata* and *Geum rivale* and 26 with *Verbascum pulverulentum* and a wide range of other dry grassland plants.

MARSH: Considered as areas where the water table is high and the land is liable to winter flooding, and taken to include the reed-swamp community where the summer water level is at or above soil level. These wetland areas were probably cut for hay or grazed as 'water meadows' but with the deterioration of drainage, more difficult grazing conditions and the diminishing demand for grass, have been allowed to revert. Here and there alders and sallows mark the movement back towards carr which was probably very extensive on the wet flood plain of the Valley floor. The only reed (*Phragmites communis*) bed of any size was at 26, and this type of community was usually marked by *Glyceria maxima*, *Epilobium hirsutum*, *Carex acutiformis*, *Filipendula ulmaria*, *Thalictrum flavum*, *Phalaris arundinacea*, *Caltha palustris*. Good examples are 21, 28, 40 and 41. In 43 an area dominated by *Angelica sylvestris* was noteworthy.

Marsh and reedswamp are also encountered intermittently through the Valley as riparian fringe vegetation.

Scrub

When the pasturage of grassland ceases, the succession to woodland begins. In the case of the survey area the invading woody species are almost invariably alder or willow, although the blackthorn (2) was striking. The progress towards carr might be encouraged in one or two sections, e.g. 16, 32 and 39.

Woodland

The term is used here to describe an area dominated by woody perennials at least 10 metres high with a closed canopy.

DECIDUOUS WOODLAND: Plantations of poplars or willows (e.g. 13, 31, 46) tended to be rather dull. Apart from one or two small clusters of trees, the most substantial wood was at 19 with an acid soil flora dominated by *Endymion non-scriptus* and with *Corydalis claviculata*. The mature carr (25) scored heavily, not only because of its development but because of the presence of a number of rare plants almost certainly introduced by F. W. Harmer at the beginning of the nineteenth century.

CONIFEROUS WOODLAND: Only one site (10) in the survey area and this rather apart from the river influence.

MIXED WOODLAND: Represented by two sites in the Valley, 6 and 23. Of these the former was the most important, and although only fringing the river valley, was considered to contribute significantly to the natural history interest of the area.

Open Water

GRAVEL WORKINGS: Range from new excavations still being worked (5, 22) through abandoned to substantially recolonised pits (8). They provide a wide variety of open ground and open water habitats within a comparatively small area, and are especially important for some birds and for plants of disturbed soils.

DYKES: Drainage channels were present in most of the areas surveyed and were scored with those areas. Some showed good growths of aquatic macrophytes and marginal plants and had rich invertebrate faunas.

PONDS: Chief among the stagnant bodies of water in the area was the section of the old river channel (39) isolated from the main river. Its range of aquatic macrophytes was the richest encountered.

RIVER: While an assessment of the river as such was not a part of the exercise, it is clearly involved in any assessment of the natural history potential of the Valley. For most of the survey area it is a typical lowland, meandering, slow-flowing, mud-floored, stream, although below the mills at Bawburgh and Keswick, and in one or two other shallow areas, it flows rapidly and with turbulence over a gravel substratum. The whole stretch has good aquatic macrophytes and a wide range of invertebrates.

Other Habitats

ARABLE LAND: While there is still only a small amount of arable land within the river valley (3, 42) there is much just outside. The valley is not likely to be exempted from the tendency for arable to increase at the expense of pasture as drainage is improved in the low-lying areas of the county.

RUBBISH TIP: The Tip (37) is unique in the survey area, and has attracted interest over many years for its alien plants and other aspects of its peculiar ecology.

Discussion

It was not the function of the Sub-Committee to propose lines of development for areas in the river valley, nor yet to comment upon the proposals of others, but to identify areas of great natural history interest so that these might be safeguarded. While the public recreational pressures on the valley are certain to increase, it was seen to be important to classify the habitats represented in the area and to conserve representative examples of the main habitats for ecological, educational and amenity purposes.

Accordingly, the Sub-Committee wishes to propose the following:

(a) That a number of sites in the survey area represent natural history resources that are unique or rare locally and deserve substantial protection. These include Cringleford Carr (25), the reed bed of Bluebell Marshes (26), and the Old River (39). To these are added an example of grazed pasture, Marston Marshes (34), and an example of ungrazed marsh, University Marshes (21). It is suggested that these sites merit particular protection, largely freed from public pressures by limiting access to professional or amateur naturalists engaged in observation or research of a non-destructive kind.

(b) That a number of sites in the survey represent good examples of their kind and should be conserved for their natural history interest. They might be served by small car parks and observation points where appropriate, and by footpaths of a limited length and penetration. The sites include Colney Gravel Pits (9), Colney Wood (6), Colney to Earlham Meadows (15), Cringleford Marshes (24) and Trowse Marshes (43).

(c) That a number of sites in the survey area might be adapted for educational use, so that parties of students or schoolchildren from Norwich and surrounding districts could carry out field study activities. Adaptation might include a small coach park, nature trails, and covered teaching/laboratory accommodation with books and equipment. Such sites might include the gravel workings of Clink Hill East (5), Earlham Hall Woods (19), grazed marsh at Earlham West (16) and at Whitlingham Marshes (45), and ungrazed marshes at Eaton Nursery (28).

The areas selected will only continue to have a value for the purposes indicated where they are managed to that end. It is urged that in the selected areas, traditional management procedures should be revived or continued, and that help and advice be made available to landowners in this respect.

In setting aside certain examples of different habitats for specified purposes, the Sub-Committee does not wish to suggest that it is insensitive to the fate of the remainder of the river valley area. Clearly there is a case for retaining as much as possible of our wetlands in the face of more intensive agricultural use and urbanisation, and the limited areas named may be insufficient to protect some forms of life that require larger areas. At the same time, where some conversion of the resources of the valley seems inevitable, the differentiation of the more important from the less important is a necessary stage in the planning process.

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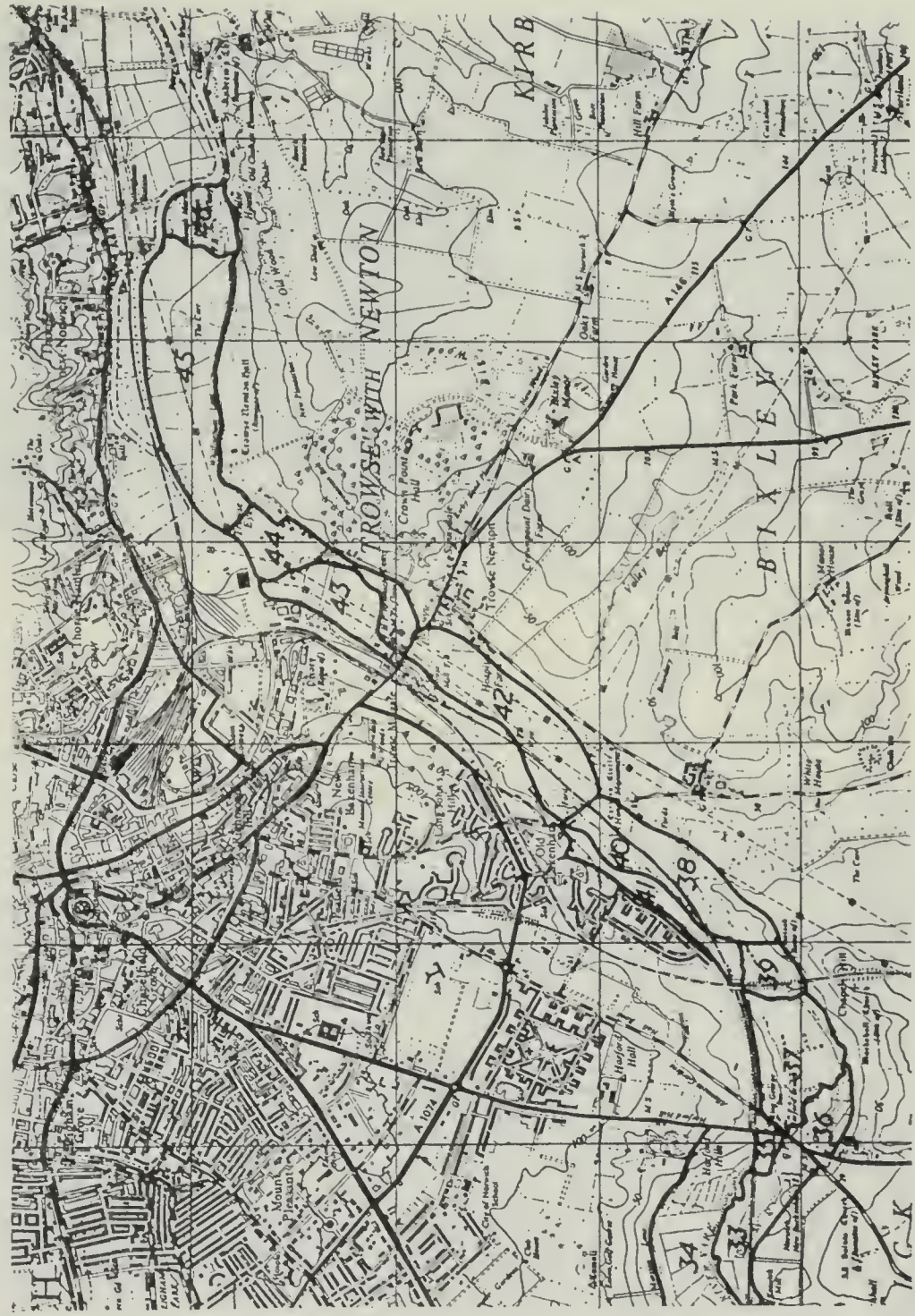
T. Tilford and D. Avon who used colour transparencies taken by G. D. Watts to make the monochrome prints reproduced in this Survey report.



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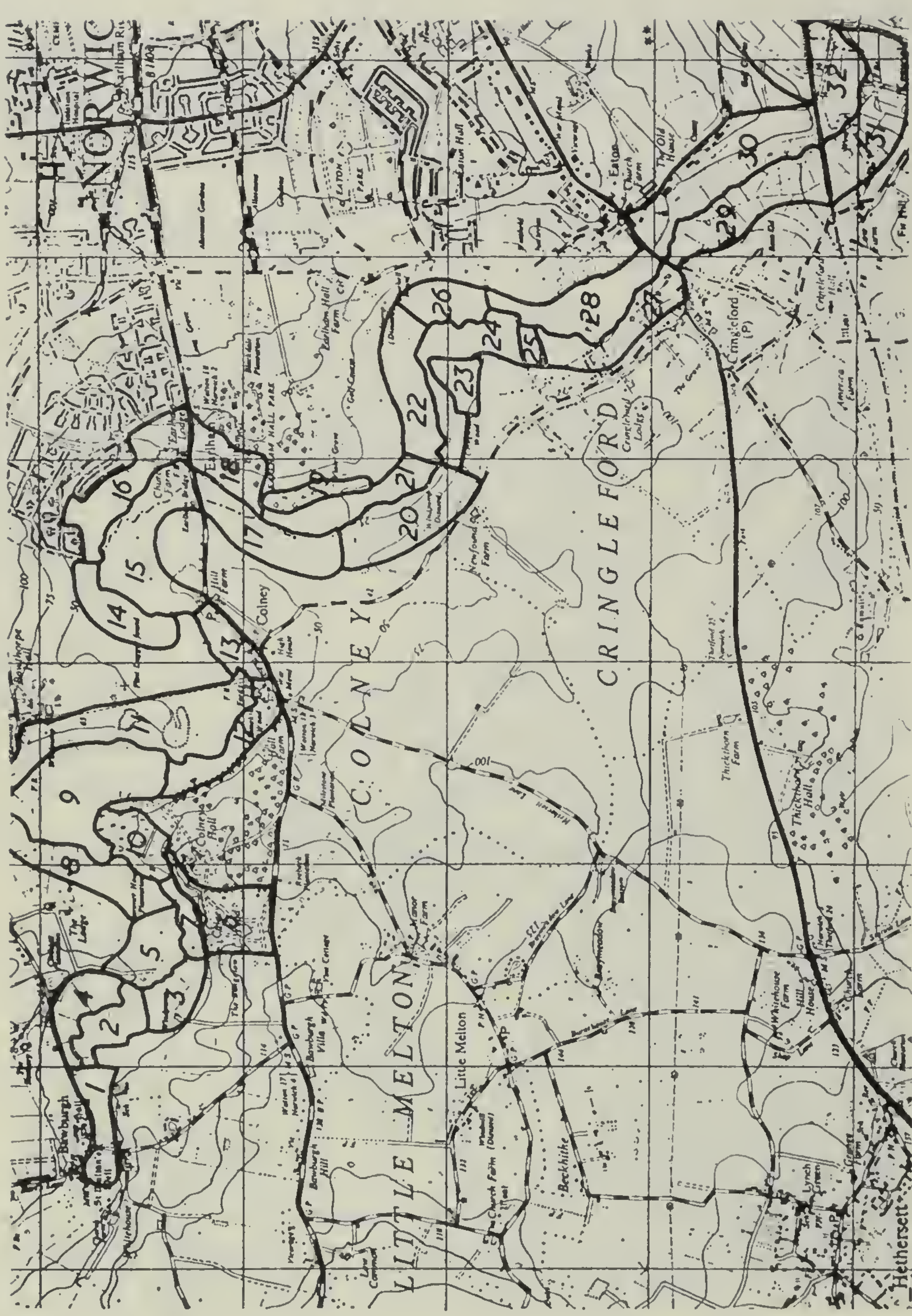

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Backwater with original vegetation : (Section 2 — Bawburgh East)

River, rough grazed pasture and wood : (Section 7 — Colney Wood Marsh)

Recolonized gravel workings : (Section 9 — Colney Gravel Pits)

Playing field, river and rough marsh : (Sections 20 and 21 — University)

Edge of rubbish tip, river, railway embankment and viaduct : (Section 37)

Meadow with buttercups, Trowse : (S. Ward of Section 44 — Whitlingham Lane)

Pyrausta perlucidalis — Hickling 1974

A MOTH NEW TO NORFOLK

T. N. D. Peet

July 1974 saw the first records in Norfolk of a scarce new resident moth, *Pyrausta perlucidalis* (*Hubner*).

This insect was originally noted in the British Isles in 1951 when examples were caught at Wood Walton Fen. They were wrongly identified then as *Pyrausta fuscalis* Schiff, and this error was not corrected until 1956. Since then, the insect has continued to be seen at Wood Walton, and more recently has been caught regularly on the Suffolk coast. There are also two examples of possible migration, single insects from Kent and Hampshire.

At dusk in early July 1974 several examples were caught, and others taken and released, along marsh walls at Hickling, Norfolk. On subsequent days further worn specimens were seen. I have no doubt it is a resident here now. As this locality has been well worked over several years, the insect may be regarded as a new resident rather than an overlooked species.

The moths fly feebly at dusk, in a manner similar to *Haritala ruralis* Scop. They are smaller than *ruralis*, and look white against the fen background. They have also been caught at mercury vapour light trap, though with not the same frequency as free-flying at dusk.

The larva is not known in this country. Continental literature records it on a thistle *Cirsium oleraceum* Scop., an introduced plant in this country and not known in Norfolk. Another thistle species is presumably the pabulum here. An attempt will be made in 1975 to find the larva.

A photograph of a male is shown. The species is also shown as a black and white drawing, with genitalia dissection, in the *Entomologists Gazette Vol.* 8 *p.*162, (1957), *by Mere and Bradley*.

THE ORIGIN OF MOUSEHOLD HEATH, NORWICH

B. M. Funnell

Summary

Mousehold Heath *sensu stricto* is considered to be part of an approximately 5 × 11 km (3 × 7 mi.) glacial outwash plain or sandur, comparable to the Salthouse (2.5 × 3 km) and Kelling (3 × 11 km) Heaths in North Norfolk, or the larger Karup Sandur (30 × 50 km in central Jutland. As in the case of the Dollerup outwash cone (9 × 10 km) on the Karup Sandur, the highest point on the Mousehold Heath *sensu lato* outwash plain (c. + 47 m O.D.) is close to the termination of a buried glacial channel or "tunnel" valley.

Introduction

Mousehold Heath *sensu stricto* is a small, 184 acre (1 × 1 km), remnant of a much larger Heath, which once stretched over 10 km northeastwards towards Salhouse and Ranworth. Prior to human intervention the vegetation, soils and landforms of this area must have been much more distinctive than they are at the present day. Stony and sandy soils underlie a gently inclined plateau-like surface at +30 to 45 m O.D. over a wide area, with steep slopes descending to the floor of the Wensum and Yare valleys at little more than 1.5 m O.D. in the vicinity of Norwich. Recognition of the distinctiveness of this area by earlier inhabitants led to its preservation as a substantial area of open heath, Mousehold Heath *sensu lato*, into the 16th century (Goreham 1973, p.5). The more restricted Mousehold Heath of the present day still preserves some of the essential habitats and geological and geomorphological features of the larger entity. This article is written in the hope of improving understanding of the origins of this notable piece of the natural heritage of Norwich. It is not based on any systematic or particularly original research, and the inferences brought forward here should be subject to further investigation and questioning in the normal way.

What is it made of?

Mousehold is capped by coarse flint gravels, well described by H. B. Woodward (1881, p. 130) and still easily seen in the surface soil of much of the remaining part of the Heath. The gravels may be up to at least 7.5 m thick, but are perhaps more typically 3 m or so. Towards Salhouse they pass laterally into gravelly sands and sands. Downwards too they pass into increasingly sandy gravel, and eventually into sands, themselves anything up to 5 m thick. These deposits together were referred to by the original geological surveyors simply as 'Plateau Gravel' and 'Sand and Gravel', and were already recognised as the outwash of glaciers.

Underlying the Mousehold gravels and sands is a more or less continuous layer of stony brick-earth, up to 6 m thick. Although its precise origin is uncertain, it seems likely to have been melted out of the base of a glacier, perhaps standing moribund, or almost so, in and surrounded by water. This brickearth occurs at the surface along the bottom of Mousehold Valley, and also beyond the limits of the main gravel spread towards Salhouse, where the sand and gravel cover becomes discontinuous.

All these glacial sediments rest on marine sands and Chalk which form the lower slopes of the Wensum and Yare valleys. The top of the marine sands is at about + 25 m O.D. Therefore the total thickness of glacial deposits underlying Mousehold Heath probably exceeds 20 m in places.

The general form of Mousehold Heath (*s.l.*)

The highest point on the glacial gravels is somewhere in the vicinity of the top of Harvey Lane, near its junction with Morse Avenue (TG 253092). Here an elevation of + 47 m is attained, but the original configuration of this summit has been obscured by extensive housing development and the digging of a large gravel pit. From this point the surface of the ground slopes north-west towards Mousehold Heath (*s.s.*), north and north-east, the most consistent and continuous slope being north-east towards Salhouse.

It seems reasonable to infer that the surface culmination, near the top of Harvey Lane, is close to the original apex or point of injection of glacial outwash deposits, which spread out to the north-west and north-east from that point, getting progressively finer and thinner in the direction of maximum transport towards the north-east. It should be stressed however, that this inference has not been tested by examination of evidence for direction of water flow in the deposits themselves. This would be a useful exercise to undertake on any temporary exposures that may occur in the gravels and sands in the future.

Figure 1 shows the surface geology, slopes and elevations developed on Mousehold Heath (*s.l.*)), together with some speculative indications of the original directions of glacial outwash water flow. Figure 2 shows the same features at a larger scale for the more immediate vicinity of Mousehold Heath (*s.s.*).

The edge of Mousehold Heath (*s.l.*)**; its relation to the Yare Valley**

Some of the more spectacular scenery of Mousehold Heath is not directly associated with the inferred outwash plain itself, which is a rather monotonous, gently inclined plane, but with the steep slopes descending to the Wensum and Yare valleys. The open views to and from St. James Hill are the most striking, but steep slopes are characteristic of the edge of the plain from Mousehold Heath itself to Thorpe St. Andrew. The fretting of the upper part of these slopes by small steep-sided valleys is of course responsible for much of the charm of Mousehold Heath. Where these steep slopes face across the Wensum, they are matched by others, not quite so high, on the other (southern and western) side. These facing slopes appear to have been caused by the breaching of a general high-level spread of glacial outwash deposits by the Wensum river, which has separated the deposits at Mousehold from other similar deposits on the high land between the Wensum and Yare valleys on the other side.

Across the Yare valley, however, downstream from its confluence with the Wensum, there are no corresponding steep slopes or deposits. Instead the plateau surface between Trowse Newton and Kirby Bedon, and parts of the Yare and Tas valley floor and sides, are underlain by Chalky Boulder Clay—a lodgement till laid down *underneath* an active land glacier. Furthermore, along the line of the Tas and Yare valleys occur a series of deep hollows, infilled with a variety of glacial deposits (Funnell 1958, p.11; Woodland 1970, p. 551).

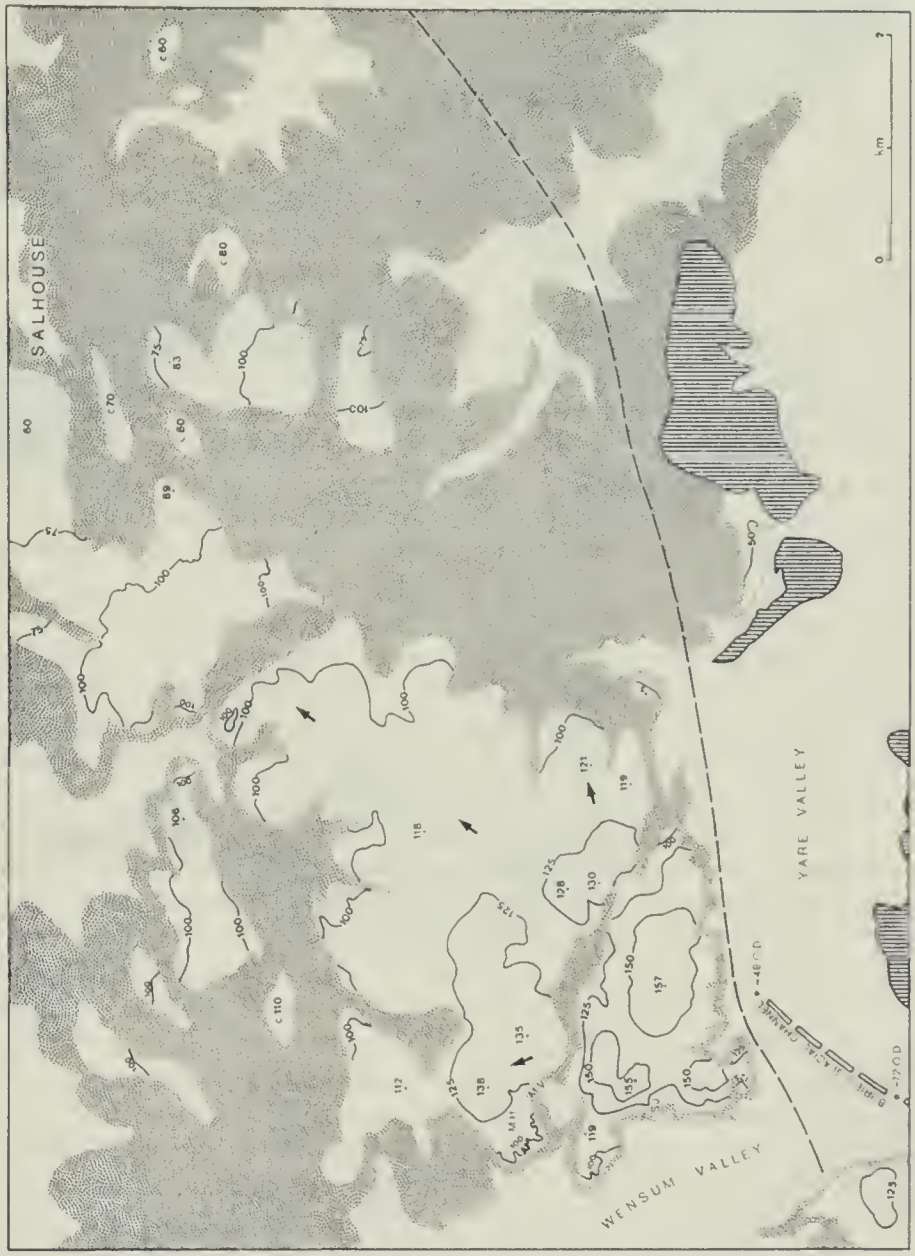

Fig. 1 Mousehold Heath (s.l.) outwash plain Chalky Boulder Clay, vertical lines: Mousehold Gravels and Sands (=Middle Glacial Sands+Plateau Gravels), blank with contours and spot heights in *feet* above O.D.;

Stony Brickearth (=Norwich Brickearth), fine stipple.

Approximate northern limit of Chalky Boulder Clay glacier, pecked line. Arrows indicate speculative directions of outwash water flow.

M.H.=Mousehold Heath (s.s.); M.V.=Mousehold Valley Drive; S.J.=St. James Hill.

The map is reproduced at a scale of approximately 1:63,360 or 1in. to 1 mile, the south west corner of the National Grid frame is at TG 230070.

(Elevations are derived from various scales and editions of topographic maps, geological outlines from the Old Series 1in. geology map.)

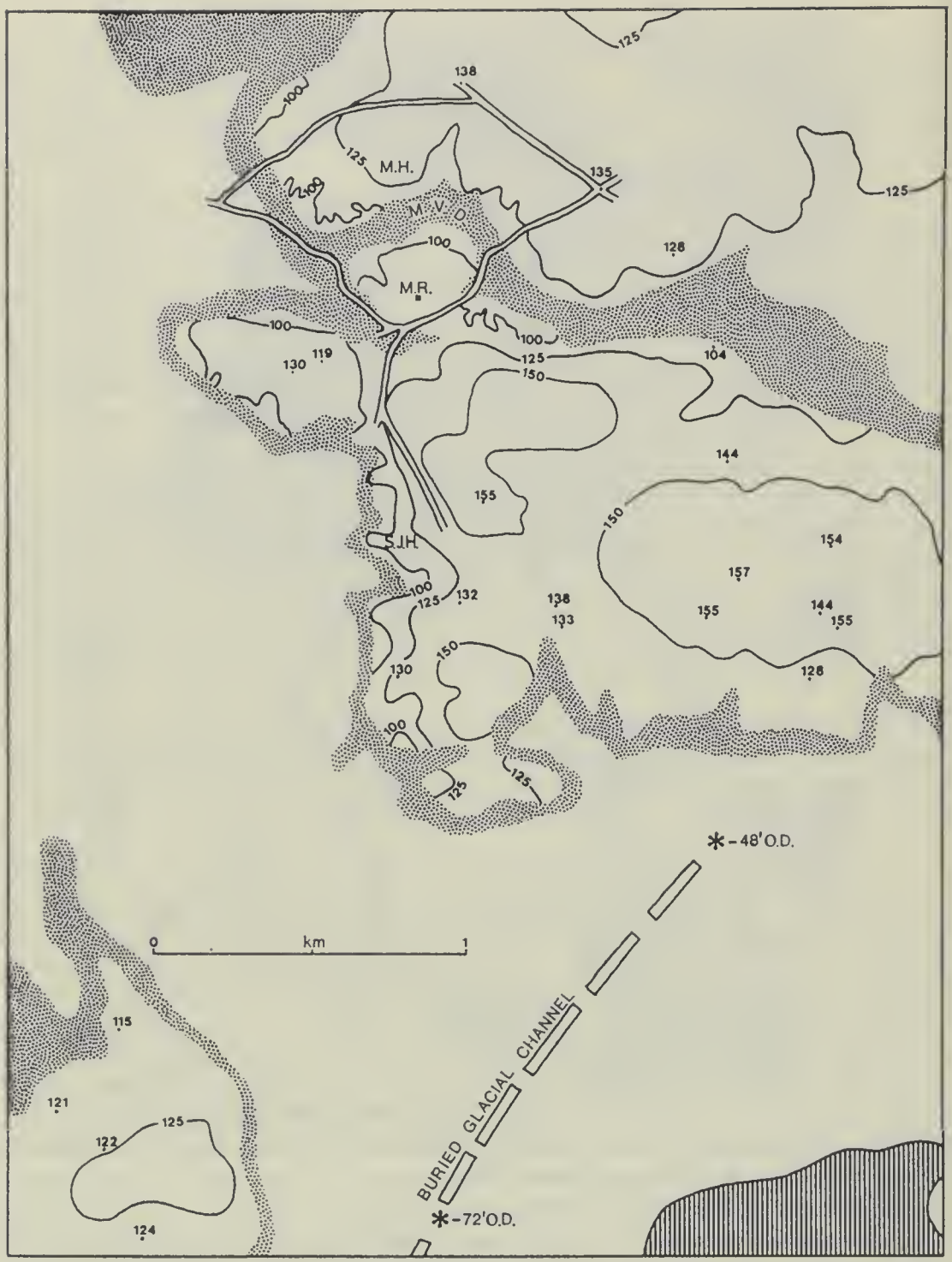

Fig. 2 Mousehold Heath outwash plain and Yare Valley. Buried Glacial Channel. Ornament and conventions as for Figure 1.

M.H.=Mousehold Heath (s.s.); MVD=Mousehold Valley Drive; M.R. Mousehold Restaurant (The Pavilion); S.J.H.=St. James Hill. Portions of principal roads and tracks shown for Mousehold Heath (s.s.) only. Other locations can be obtained from the National Grid frame—the reference for the south-west corner of the map is TG 230070, and the map is reproduced on a scale of approximately 1:25,000 or 2½ inches to 1 mile.

These appear to terminate northwards near the bottom of Harvey Lane against the north side of the Yare valley. Such features are generally known as 'buried glacial channels' in East Anglia (Funnell 1958), and similar features in Denmark are known as 'tunnel' valleys (see Woodland 1970). Formerly thought to be created mainly by sub-glacial melt-waters, eroding under hydrostatic pressure, increasing evidence of actual ice erosion by tongue or valley-glacier-like lobes of ice has been adduced by Danish geologists (Hansen 1971). Be that as it may- and it would go far to explain the anomalous northward extension of Chalky-Jurassic boulder clay in the buried glacial channel at Trowse (Funnell 1958, p.13) —there is still quite a general association of terminations of such 'tunnel' valleys with the apices of glacial outwash cones in Denmark. A good example is the Dollerup outwash cone in central Jutland, where the apex of the cone, standing at +80 m, stands in close juxtaposition to the end of the Viborg-Hald Sø 'tunnel' valley, at present occupied by the Hald Sø, a lake with its surface standing at only +9 m above sea level. Here in Norfolk we seem to have a similar situation. The Tas valley buried glacial channel, eroded in places as deep as —35 m O.D., but subsequently infilled, by a variety of glacial deposits to +7.5 m or a little above O.D., apparently terminates, or at least abruptly changes direction, on the north side of the Yare valley (Figs. 1 and 2). Immediately above it at +47 m O.D., and only 0.8 km distant to the north, is the culmination of the Mousehold Heath outwash plain. The inherent hydraulic problems in raising coarse gravels a large vertical interval over such a short horizontal distance are not inconsiderable (Hansen 1971, p. 302), and perhaps we should look to the general level of the Chalky Boulder Clay south of the Yare (at +20 to 30 m O.D.) as the more likely level of derivation. What is clear, however, is that the present southern border of the Mousehold Heath outwash plain must be very close to the original ice contact position (defined by the Chalky Boulder Clay deposit). This is not to say that the steep slopes down to the river at Thorpe St. Andrew are the original ice contact slopes. The glacial deposits with which we are concerned were brought by the first glaciers to occupy the Norwich area, and there has been ample time and opportunity for any original ice contact slopes to be eroded and degraded since then, during subsequent glacials and interglacials. However the open, pervious nature of the outwash gravels and sands would enable them to retain steep slopes as they receded, assisted by spring-sapping at their contact with the underlying less pervious stony brickearth, and continued erosion of the north side valley by the River Yare would maintain the steepness of the lower slopes.

Epilogue

I hope the foregoing account gives a reasonably correct answer to the question: Why is Mousehold Heath there? At least it is an attempt to do so in the light of one person's current understanding of these matters. Perhaps it will add another dimension to the Heath for those who value it mainly for its history, biology or amenity, and encourage others to look more closely and discriminatingly at the way in which it came to be made.

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(*Although it was not previously unknown to the author, this article was inadvertently overlooked during the preparation of the text and illustrations of the present paper. The conclusions and, in particular, the line of the buried glacial channel and of the approximate northern limit of the Chalky Boulder glacier, given in the present paper were therefore independently assessed. Pending the publication of the Official Memoirs and 1:50,000 geological maps of the Attlebridge and Norwich sheets Cox and Nickless' article provides a useful account and summary of their views on the glacial geology of the area.*)

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CONSERVATION OF THE SEA ANEMONE *NEMATOSTELLA VECTENSIS* IN NORFOLK, ENGLAND AND ITS WORLD DISTRIBUTION

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Summary

(a) *Nematostella vectensis* Stephenson, 1935 has been recorded from nine saline pools at six different localities in England since 1929; from nine pools at a single locality in Canada since 1965; and from several marsh pools and sheltered bays at five localities in the U.S.A. since 1939. These localities occur on the coasts of the northern English Channel, the western North Sea and the eastern Pacific and western Atlantic Oceans.

(b) The North American populations of *N.vectensis* appear to be stable. However, in England the species is in danger of extinction, and is now known to survive in only three of the original pools.

(c) In Norfolk, England, the two populations at Wells-next-the-Sea were destroyed by pollution, and the original Cley-next-the-Sea population perished when Half-Moon Pond dried up in 1975. However, a remnant of the latter population was saved and transferred to a nearby pool, but the future of this artificial colony is uncertain.

(d) Some of the research carried out as part of a conservation scheme in Norfolk is described, with details of the management of Half-Moon Pond; its drying up; and the establishment of an artificial colony of *Nematostella*.

(e) The effects of human influence on the status of *Nematostella* in England are described and the wider implications for the north Norfolk coast and its biota are discussed.

Introduction

Nematostella vectensis Stephenson, 1935 is a rare edwardsiid sea anemone which burrows in the soft mud of poikilohaline pools or creeks in salt marshes. It has been recorded only from England and North America. As with many other marsh species, plotting of its geographical distribution is difficult due to the paucity of research on appropriate habitats. It is possible that *N.vectensis* will eventually be found in the extensive marshes and brackish waters of north-west Europe and that its known distribution in North America will be extended.

In England, *N.vectensis* from East Anglia has recently been described (Williams, 1975). A long-term study on its biology was begun in Norfolk in 1971, and by 1973, it was clear that its status in this county was rather precarious, due partly to pollution (Williams, 1973a) and partly to the natural instability of its preferred habitat. Accordingly, it was decided to transfer some anemones from Half-Moon Pond at Cley-next-the-Sea to one or more safer pools. This plan required a detailed understanding of the ecological requirements of *N.vectensis*, and hence could not be carried out immediately. Further research on Half-Moon Pond was needed and conditions in several potential recipient pools

had to be monitored. The first transfer was planned for the autumn of 1975, but in fact was carried out slightly earlier when Half-Moon Pond dried up in the hot, dry summer of that year.

The purpose of this paper is to document the presently known world distribution of *N.vectensis* with special reference to its status in England and to describe some of the research necessary for its conservation in Norfolk. Details of the management of Half-Moon Pond, its drying up and the transfer of some anemones which were saved are also given.

Distribution of *N. vectensis* in England

All known localities, published and unpublished, are shown in Fig. 1. A distinction is drawn between those where the anemone still survives and those where it is known or suspected to be extinct.

(a) ABRAHAM'S CREEK, WELLS-NEXT-THE-SEA, NORFOLK (Ordnance Survey National Grid Reference TF 909453). I found *N.vectensis* here in 1971 (Williams, 1973a and b). Over the following two years it became scarcer with the decreasing depth of the oxidized layer at the mud surface. *Nematostella* was last recorded here on 23 April 1973 (a single specimen). In November, 1975 the mud had no oxidized layer and *Nematostella* is probably extinct here.

(b) ABRAHAM'S BOSOM, WELLS-NEXT-THE-SEA, NORFOLK (TF 912453). Dr. R. Hamond first found *Nematostella* in the north-east corner of this lake (Williams, 1973a). I found none there in 1971, but rediscovered the anemone on the western side where the ditch from Abraham's Creek enters. The worsening pollution of this locality, which is bounded by a caravan site, was noted by Williams (1973a, p.391) and the last record is a single dying specimen on 7 September 1974. *Nematostella* is probably extinct here.

(c) HALF-MOON POND, CLEY-NEXT-THE-SEA, NORFOLK (TG 049452). *Nematostella* was first found here by Dr. R. Hamond in 1966 (Hamond, *in litt.*). The recent management of the pond is described on p.262. *Nematostella* perished when the pond dried up in August, 1975 (see below).

(d) LAGOON O, SHINGLE STREET, SUFFOLK (TM 359409). Robson (1957) found *N.vectensis* here in 1956 and 1960 (Dr. Elaine Robson, *in litt.*). I searched this lagoon frequently between 1973 and 1975 but never found any anemones. The mud is sulphurous with no oxidized layer and *Nematostella* is probably extinct here.

(e) LAGOON 1, SHINGLE STREET, SUFFOLK (TM 363419). I found *N.vectensis* here in 1973 (Williams, 1975) and it is still abundant. The lagoon is unpolluted and since it is replenished by sea water flowing through the shingle bank which separates it from the North Sea, it is unlikely to dry up. The water level was unaffected by the dry summer of 1975.

(f) LAGOON AT PAGHAM, SUSSEX (SZ 884970). Mr. R. L. Manuel found *Nematostella* scarce here in 1974 (Manuel, *in litt.*). I failed to find any anemones in this lagoon a year previously, at which time it seemed rather polluted. The substrate is mainly shingle with pockets of black sulphurous mud. There is much in com-

mon between Abraham's Bosom (Norfolk) and this lagoon, which is also adjacent to a caravan site. The future of *Nematostella* here seems to be in jeopardy.

(g) LAGOONS AT BEMBRIDGE, ISLE OF WIGHT (SZ 637882). Stephenson (1935) gave details of *Nematostella* in two lagoons in 1929. However, attempts to rediscover the anemone in recent years have failed and it is doubtful whether it still exists at this, the type locality (see Williams, 1975), which may have been somewhat altered topographically (Manuel, *in litt.*).

(h) THE FLEET AT LANGTON HERRING, DORSET (SY 607814). This record is due to Manuel in 1973 (*in litt.*). The site differs from all others in England, in that it is in direct communication with the sea, although it is still extremely sheltered. There appears to be no immediate threat to *Nematostella* here.

Fig. 1. Distribution of *N. vectensis* in England
● Surviving populations
○ Populations known or suspected to be extinct

Since 1929, the total number of records of *Nematostella* in England is nine at six different localities. Only three populations now definitely survive (at Shingle Street, Pagham and Langton Herring), and one of these (Pagham) is unstable. The anemones transferred from Half-Moon Pond (see p.264) are not considered here, since this new population is not yet stabilized.

Distribution of *N.vectensis* in North America

All known localities, published and unpublished, are shown in Fig. 2. As far as is known, all populations are stable and none has become extinct since being first recorded.

(a) COOS BAY, OREGON, U.S.A. *Nematostella* lives in small pools in the *Salicornia* marshes and on open mud flats along the upper bay and tidal reaches of the Coos River (Miss J. Hanna and Prof. C. Hand, *in litt.*).

(b) TOMALES BAY, CALIFORNIA, U.S.A. A pool in a marsh adjacent to the mouth of Walker Creek contains *N.vectensis* (Hand, *in litt.*).

(c) SAN FRANCISCO BAY, CALIFORNIA, U.S.A. Here the anemone lives mainly in marsh pools, but was once recorded in a protected embayment on the Bay shore at Berkeley (Hand, *in litt.*). It is also recorded from a marsh pool on Bay Farm Island (Hand, 1957).

Fig. 2. Distribution of *N. vectensis* in North America

(d) BISSEL COVE, RHODE ISLAND, U.S.A. *Nematostella* is recorded by Nixon and Oviatt (1973) in a marsh embayment of Bissel Cove which opens into Narragansett Bay.

(e) WOODS HOLE, MASSACHUSETTS, U.S.A. Crowell (1946) described *N.pellucida* as a new species found in the Mill Pond in 1939, but this anemone was subsequently shown to be a variant of *N.vectensis* (Hand, 1957; Williams, 1975).

(f) MINAS BASIN, NOVA SCOTIA, CANADA. At the western end of the Minas Basin around Kingsport, Canning and Canard, *Nematostella* has been found in nine pools in the marshes since it was first discovered in this area in 1965 by Bailey and Bleakney (1966) (Mr. P. G. Frank, *in litt.*).

The North American localities for *Nematostella*, unlike the English ones, usually cover quite large areas, where the anemones may live in many small marsh pools and also on nearby sheltered tidal sites such as estuarine mud flats. None of the populations is reported to be endangered in any way.

Conservation of *N.vectensis* in Norfolk, England

All of the three known localities for *N.vectensis* in Norfolk, Abraham's Bosom, Abraham's Creek and Half-Moon Pond, have been actually or potentially threatened by pollution for several years (Hamond, 1972; Williams, 1973a). At least three kinds of pollution may be involved (see Mellanby, 1972): organic pollution, which directly increases the biochemical oxygen demand (B.O.D.); eutrophication, which by the increase in concentration of nutrient salts, encourages algal blooms and indirectly increases the B.O.D.; and the introduction of toxic wastes.

Abraham's Bosom might be affected both by organic pollution originating from the summer caravan site at the water's edge and by eutrophication caused by roosting water birds defaecating into the water. On 6 January 1976, pollution was largely confined to the northern end, just as it was on 7 January 1973 (see Williams, 1973a). This is probably because the current runs across from Abraham's Creek, south-east towards the outflow (see Hamond, 1972) and there is therefore little water movement at the northern end. The situation is exacerbated in the summer when the outflow is partially dammed to raise the water level in Abraham's Bosom. This also reduces the flow of Abraham's Creek and depletes its oxygen content. Unfortunately, the total area of water (5.061 acres) is too large to attempt conservation, and in any case, pollution is too far advanced to save many of the indigenous invertebrates.

However, Half-Moon Pond seemed to provide a situation in which a conservation scheme might be feasible. First, the pollution was caused by toxic wastes, which is fairly easy to control if early action is taken. The small size of the pond (less than 0.5 acre in the summer) facilitated manual clearing of the building and agricultural refuse illegally dumped from the adjacent car park, which reduced the size of the pond and introduced lime, rusting iron, oil and pesticide residues. Second, once the site was cleared, the prevention of further dumping was possible, since the pond is on land belonging to the Norfolk

Naturalists' Trust. Naturally, adverse climatic conditions, the most dangerous being drought, could not be controlled. It was planned, therefore, to terminate the early stages of pollution and to maintain control by careful management, in order to give time for research on the biology of *Nematostella* to be completed. When this work was done, one or more transfers to pools less vulnerable to pollution and drought were to be attempted.

(a) THE MANAGEMENT OF HALF-MOON POND. The pond was cleared on 24 August 1974, when it was very low due to drought. The rubbish removed included bricks, tiles, sacks of lime and builders' débris, asbestos and polythene sheets, mattresses. bed frames, broken car windscreens, barbed wire, guttering, iron pipes, pesticide drums, oil cans (one full of sump oil), aerosol cannisters, tin cans, broken bottles, polystyrene cups, L.P. gas cannisters and large quantities of paper left by picnickers. After this initial effort, the pond was routinely cleared of rubbish (mostly tin cans and paper) during subsequent monthly visits.

In an attempt to control dumping, a notice warning offenders of possible prosecution was erected to face the car park at the western end of the pond. This had no effect, so after the pond was cleared, a wire fence was erected across its western end to prevent vehicles approaching from the car park.

(b) ECOLOGICAL RESEARCH. In addition to the above expedients, research on the ecology of *N.vectensis* was proceeding simultaneously. Some results pertinent to the conservation scheme are outlined here.

The burrowing habit in aquatic animals, besides providing protection from predators, can also afford a short-term means of surviving desiccation if the substrate becomes exposed to the air. In a lagunar habitat, this may happen during periods of drought.

In an experiment on the survival of *Nematostella* in such circumstances, groups of ten anemones were allowed to burrow into about 1 cm of mud covered by 1 cm of water in transparent plastic dishes. The anemones were well fed, but their nutritional state was unlikely to affect the results, since *Nematostella* can be starved for 80 days with no ill effects. The temperature ranged from 16.5 to 23.4 deg.C during the experiment.

At the beginning of the experiment, the water was siphoned from all the dishes but one, which served as a control. Initially, a film of water about 0.5 mm deep remained on the mud surface. The anemones retreated a short way into their burrows, leaving a small depression into which water drained where the anemones could partially expand their tentacles. As the film of water evaporated, the tentacles of most anemones contracted after 8 hours, and after 31 hours all had completely withdrawn into their burrows. By 3 days, they had burrowed to the bottoms of the dishes and were lying horizontally. To assess survival, water was added to different dishes at intervals and the numbers of anemones emerging, and the times taken were noted. When *Nematostella* is emerging from dried mud, the anterior end of the column is introverted, unlike when emerging normally from thixotropic mud. After 5 days, the few surviving anemones were trapped under the dried out mud and had to be released by breaking it up. Results are shown in Table 1.

TABLE 1

N. vectensis: Survival data for up to 6 days burial in mud without water

DAYS ELAPSED	NUMBER AND PERCENTAGE OF SURVIVING ANEMONES	TIME TAKEN TO EMERGE AFTER ADDITION OF WATER	FURTHER OBSERVATIONS
1	10/10 (100%)	Ca 5 minutes	Mud still soft.
3	20/20 (100%)	10-15 minutes	Mud fairly hard.
4	21/30 (70%)	Some after about 1 hour —others still trapped	Not all anemones able to emerge unaided. Those which could not were released by breaking up the mud. These were sick.
5	7/20 (35%)	None had emerged after 7 hours	All anemones surviving had to be released, but were all very sick.
6	0/10 (0%)	—	—

In the laboratory situation in shallow mud, the factor limiting survival was rapid desiccation. The mud did not become anaerobic. To compare this situation with field conditions, samples of mud were taken 0.5m from the water's edge of Half-Moon Pond on 5 July 1974 in an area where the *Ruppia cirrhosa* was dried up and known to have been exposed for at least four days. The mud was moist and similar in consistency to the mud in the laboratory experiment after one or two days, but it was black and clearly poor in oxygen. Living anemones (<2mm long) were recovered, but all appeared to be sick. Under these conditions, the limiting factor for survival seems not to be desiccation, but anoxia. Being deeper, the mud remains moist for a longer time, but this allows bacteria to continue respiring and the anaerobic layer encroaches upwards on the anemones as they attempt to burrow deeper. The maximum survival time under field or laboratory conditions, however, is probably not much different, i.e. between five and six days, maybe a week at the most.

Nematostella with gonads have been found throughout the summer and autumn. It is now known that the species reproduces asexually as well as sexually. Transverse fission was actually observed during January 1975 and might continue throughout the year. The "double anemones" and malformed individuals recorded by Williams (1975) probably resulted from this process. The food of *Nematostella* in Half-Moon Pond is mainly harpacticoid copepods and the larvae of the midge *Chironomus salinarius*. The data on reproduction and feeding suggested that the best time to transfer *Nematostella* would be during the autumn when both sexual and asexual reproduction were in progress and food would be plentiful following the summer breeding season.

Several pools were monitored for about a year to ascertain whether they were suitable for *Nematostella*. Particular attention was paid to salinity and temperature ranges, substrate type and the indigenous flora and fauna. It was important that the pools should not dry up, even in severe droughts; that prey for *Nematostella* should be plentiful; that no other rare species should be endangered by the introduction of the anemones; and that no predators of *Nematostella* should be present. Of special importance is the depth of the oxidized

layer at the mud surface, which should ideally be at least 1cm deep at all seasons. Two pools were finally selected which satisfy these conditions. They are both within half a mile of Half-Moon Pond, and on the Cley Marshes Nature Reserve which is a Site of Special Scientific Interest owned by the Norfolk Naturalists' Trust. The possibilities of dumping or other human disturbances are minimal, since both pools are inaccessible to motor vehicles (unlike Half-Moon Pond).

(c) TRANSFER OF ANEMONES. The summer of 1975 produced a severe drought during which Half-Moon Pond dried up some time between 25 July and 11 August, before the planned transfer of anemones. The actual date of drying up was probably on or about 4 August i.e. one week before the situation was discovered. Previous work (see above) indicated that some anemones might still be living. On 11 August about 20 kg of mud down to a depth of about 10 cm was removed and mixed with 75% sea water and 25% tap water, then aerated and left to settle in a cool shady room. Twenty-four hours later, 8 anemones, all <4mm long, had reached the mud surface. The mud was then resuspended and 24 hours later, 2 more anemones, one about 1 cm long, were recovered. Further resuspension produced no more anemones, and similar treatment of another 35 kg of mud collected on 12 August gave negative results.

The 10 surviving anemones were kept in clean 75% sea water and fed daily with a suspension of mashed prawns; the water was also changed daily. After 3 days, the anemones were much healthier and on 15 August they were released together in one of the selected pools on the Cley Marshes (see above). For security reasons, details of the precise locality are not given here, but have been deposited with the Norfolk Naturalists' Trust, the Nature Conservancy Council, the Royal Society of London and the British Museum (Natural History).

On 13 December 1975, 7 healthy anemones were seen within 10 cm of the release point at the new locality, which will be monitored regularly. A search of Half-Moon Pond, now full again, confirmed the extinction of *Nematostella* there.

Discussion

Nematostella vectensis is on the verge of extinction in England. This is entirely due to human influence. The natural habitat of this anemone appears to be in shallow pools and at the extremely sheltered edges of marshes in estuaries and bays. The main means of dispersal is probably by storm surges sweeping anemones from pool to pool over the marshes, and possibly to a lesser extent by being carried in weed by wild fowl (Williams, 1973a). The North American records probably represent the natural distribution pattern of the species, whereby, as old pools dry out and new ones are formed, developing marshes are restocked, either from other pools or from the seaward edge of the marsh. In England, however, where agricultural land is at a premium, sea walls have been built since about the 13th Century (Grieve, 1959) and the already restricted salt marsh areas (see Boyden, 1969) have become even smaller. In Norfolk, the histories of the sea defences are well documented for Wells (Purchas, 1965; Hunt, 1971) and Cley (Cozens-Hardy, 1972). Hence *Nematostella* in England probably became more and more localised, as sea defences were improved and reduced dispersal by storm surges, until only the present fragmented distribution remained.

Once *Nematostella* habitats became isolated from the sea and from each other, their vulnerability to climatic and further human influences increased. Many lagoons naturally become silted up and colonised by plants over the years (*Robinson, 1953*), and without tidal influence are more likely to dry out, as did Half-Moon Pond. I have seen lagoons at Shingle Street dry out or become infilled and colonised by the reed *Phragmites communis*. In addition, since World War II, there has been increasing pressure on coastal areas for recreational pursuits with associated caravan sites, holiday homes etc. which have brought with them pollution of various kinds as reported herein. It is significant that the only two stable *Nematostella* populations (The Fleet and Shingle Street) of the three known to be remaining in England, live behind *natural shingle banks* (*not sea walls*) which are neither attractive to holiday-makers nor conducive to human habitation; and allow sea water to percolate through.

It is clear, therefore, that the only means of conserving *Nematostella* in England is by artificially colonising carefully selected stable lagoons free from adverse human influence, since the building of sea walls has made natural recolonisation impossible.

Turning to wider implications, there are undoubtedly other animals and plants (*see Williams, 1973a*), with ecological requirements similar to those of *Nematostella* which are endangered, although none is known yet to be on the verge of extinction. However, the loss of more susceptible biota like *Nematostella* from a locality should serve as an early warning of pollution. Sooner or later, if pollution goes undetected and unchecked, the more robust species of molluscs and crustaceans will also succumb and finally, with no food present, many of the avifauna and other small vertebrates will migrate away. This, of course, would be disastrous for Norfolk, a county so well known for its marshland fauna.

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ELUMA PURPURASCENS BUDDE-LUND (CRUSTACEA: ISOPODA) A WOODLOUSE NEW TO BRITAIN FROM NORFOLK

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Eluma purpurascens Budde-Lund is a primitive Armadillidiid, being in the same Family as the common "pill-woodlouse" *Armadillidium vulgare* (Latreille). *Eluma* is readily distinguished from *Armadillidium* spp, which have compound eyes, by having eyes composed of a single large ocellus. In *Armadillidium* spp the telson reaches to or beyond the apex of the uropods, but the telson of *Eluma* is shorter than the uropods. The colour is usually mottled purplish-brown and individuals can grow to 16 mm long, as long as the largest British *Armadillidium* spp. For further descriptions and figures see Edney (1953) and Sutton, et al (1972).

Eluma purpurascens was first recorded in the British Isles from Ireland by Pack-Beresford (1908) who found it at Howth, Co. Dublin. Subsequently it has been found in Co. Dublin at Portmarnock Station (Bagnall 1908) North Bull Island (Humphries & Kennedy 1957) and Portmarnock Point (Harding 1969). It has been recorded at all these sites during 1975 and was also collected at three sites further north in Co. Dublin (D. Doogue & N. M. Reardon, personal communication).

I collected two female specimens of *Eluma purpurascens* on the cliffs at Overstrand near Cromer (N.G.R. 63/252406) on 11 and 12 July 1975. The cliffs on this coast are unstable, being composed of glacial deposits overlying probable Upper Cretaceous strata. Land-slips, water-worn gullies and areas of bare clay are plentiful. The upper levels of the cliffs are more stable with small enclaves where the vegetation is luxuriant and rich in species. Where vegetation is present on the lower cliffs it is dominated by ruderal species such as *Tussilago farfara* L. and *Lotus* sp. One specimen of *Eluma* was taken at dusk under a loose clay "boulder" in a scree type situation on the lower cliffs. A second specimen was taken the following morning in species rich vegetation with much *Equisetum* sp. on the upper level of the cliff.

Also recorded with *Eluma* were two species rarely recorded away from synanthropic situations—*Androniscus dentiger* Verhoeff and *Cylisticus convexus* De Geer. Both species have in recent years been recorded from several other sites on sea cliffs which are soft and unstable and with a similar vegetation. It is probable that this habitat is a natural one for these two species in the British Isles.

Vandel (1962) suggests that the occurrence of *Eluma purpurascens* in Ireland and in western France is as the result of being spread by man. The species is widespread in the Iberian peninsula, Algeria and in the Azores, Madeira and Canary Islands. To judge from the occurrence of the species in Ireland and Norfolk, it is not particularly synanthropic. Several of its Irish localities are at remote parts of sand-dune systems. It seems probable that *Eluma* is dependant on high insolation and is particularly associated with unstable coastal habitats such as dune systems and cliffs.

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SOME NOTABLE HOLLIES *ILEX AQUIFOLIUM* IN NORFOLK WOODLANDS

P. W. Lambley

During studies by myself and Dr. Francis Rose on the lichen flora of Norfolk a number of large specimens of holly *Ilex aquifolium* have been found in Norfolk woods. The largest so far found occur in the southern part of Merton Park in an area known as 'Merton Oaks'. Some of the specimens here reach 0.7 metres in diameter and therefore equal in girth some of the famous trees in Staverton Thicks, Suffolk, though they are less tall. Merton Oaks itself is mainly mature oak woodland with a few large beeches. In the eastern part of the area one of the oaks reaches an enormous size. This is the 'Conquest Oak' which although now dead has still a very impressive trunk of about 3.3 metres diameter 1 metre from the base. There is a Walsingham family tradition that it was planted at the time of the Conquest.

Very large hollies also grow on the Pond Hills near Hempstead in north Norfolk and although here there is only a small fragment of woodland on hilly terraine they are growing with some very large rowan trees *Sorbus aucuparia*.

These sites, together with Swanton Novers Great Wood and Staverton Thicks in Suffolk are the only known East Anglian localities for the lichen *Stenocybe septata* which is largely restricted to holly.

Acknowledgements: Mr. E. L. Swann, F.L.S., for confirming the identification and Mr. E. T. Daniels for helpful discussion.

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THE GRAPE HYACINTH *MUSCARI ATLANTICUM* IN NORFOLK

P. W. Lambley

On April 11th 1974 I found a specimen of *Muscari atlanticum* growing on a grass covered grave in Larling Churchyard 10 km. square (52/98). Growing nearby were two specimens of *Muscari botryoides*. Other plants of interest in the churchyard were *Iris foetidissima* and *Veronica filiformis*.

Although *Muscari atlanticum* is described in the Flora of the British Isles as native in Norfolk there seems to be some doubt as to its status in the county. Kirby Trimmer records it from the city wall at Norwich and St. Benets Abbey; both sites where it is likely to have been introduced. Nicholson considered it doubtfully native and records it in addition from between Colkirk and Fakenham and from Harleston. At this latter site it was also considered doubtfully native by Gilpin. In an annotated copy of Nicholson (in Norwich Castle Museum) Dixon-Hewitt adds 'said to occur near Hockham 1906 and Caistor St. Edmund 1939 probably always as a garden escape'. The only recent record is by E. T. Daniels from a roadside at Riddlesworth (52/98). As some plants were growing in the garden he considered that it was most probably an escape from the cottage, although it was always possible that the cottage garden material was derived from wild stock.

The Larling plant may also have been planted, though perhaps originally derived from wild stock in the area, especially as the plant is now rarely grown in gardens. It is true, though, that churchyards often carry relict populations of meadow and woodland plants and it is just possible that it happened in this case. This doubtful status is surprising when compared with its relative abundance in parts of the Suffolk Brecks.

LONCHOPTERA SCUTELLATA STROBL. (DIPTERA, LONCHOPTERIDAE) NEW TO NORFOLK

J. W. Ismay

I captured several specimens of this species at Hardley Floods on 29th October 1973 and 20th November 1973. Smith (1969, Handbooks for the Identification of British Insects Vol. X pt. 2(ai)) records *L. scutellata* from Suffolk but I have seen no records from Norfolk. My specimens were found in *Carex*, *Phragmites* and *Glyceria* litter.

A NOTE ON *COMPROMYZA PEDESTRIS* MG. (DIPTERA, SPHAEROCERIDAE)

J. W. Ismay

This short-winged species of fly was first recorded from Norfolk by E. A. Ellis (*Eastern Daily Press, 16th November, 1968*) from specimens from flood refuse at Coldham Hall, Surlingham. In December 1973 Dr. Ellis found the species again in the same habitat. On 10 December 1973 I visited Wheatfen Broad and found *C. pedestris*. 7 specimens were found in two tussocks of *Carex paniculata*, and all were in the remains of small mammal nests in the sides of the tussocks. There is a specimen in the British Museum (Natural History) found under corrugated iron, but all the other records of this species from Britain have been from flood refuse. Many species of Sphaeroceridae have been recorded from small mammal nests and this may be the natural habitat of *C. pedestris*.

NOTES TO CONTRIBUTORS

1. All manuscipts submitted for publication should be sent to Dr. E. A. Ellis, Wheatfen Broad, Surlingham, Norwich.

2. Manuscripts should be typed double spaced on one side of the paper. Latin names of genera and species should be underlined. Dates should be in the form 1 January 1972. Text figures should be referred to as Fig. 1, etc.

3. All Latin names should be followed by the authority when the name is first mentioned in the text or table.

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Bloomfield, E. N., 1905. Fauna and flora of Norfolk. Trans. Norfolk & Nor. Nat. Soc., 8. 117-37.

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